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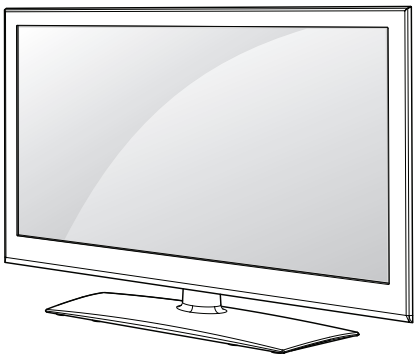
LED LCD TV
SERVICE MANUAL

CHASSIS : LD12B

MODEL : 32LV470S 32LV470S-ZC

CAUTION
BEFORE SERVICING THE CHASSIS,
READ THE SAFETY PRECAUTIONS IN THIS MANUAL.



P/NO : MFL67002341 (1107-REV00) Printed in Korea

CONTENTS

SAFETY PRECAUTIONS

IMPORTANT SAFETY NOTICE

Many electrical and mechanical parts in this chassis have special safety-related characteristics. These parts are identified by ⚠ in the Schematic Diagram and Exploded View.
It is essential that these special safety parts should be replaced with the same components as recommended in this manual to prevent Shock, Fire, or other Hazards.
Do not modify the original design without permission of manufacturer.

General Guidance

An **isolation Transformer should always be used** during the servicing of a receiver whose chassis is not isolated from the AC power line. Use a transformer of adequate power rating as this protects the technician from accidents resulting in personal injury from electrical shocks.

It will also protect the receiver and it's components from being damaged by accidental shorts of the circuitry that may be inadvertently introduced during the service operation.

If any fuse (or Fusible Resistor) in this TV receiver is blown, replace it with the specified.

When replacing a high wattage resistor (Oxide Metal Film Resistor, over 1 W), keep the resistor 10 mm away from PCB.

Keep wires away from high voltage or high temperature parts.

Before returning the receiver to the customer,

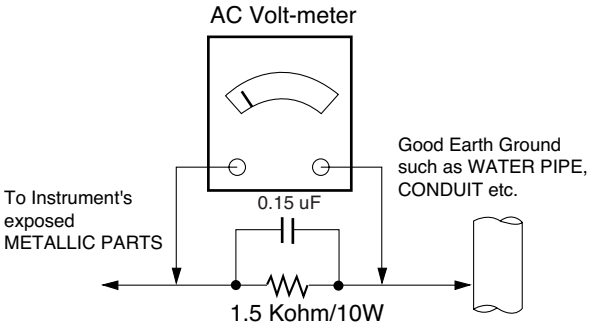
always perform an **AC leakage current check** on the exposed metallic parts of the cabinet, such as antennas, terminals, etc., to be sure the set is safe to operate without damage of electrical shock.

Leakage Current Cold Check(Antenna Cold Check)
With the instrument AC plug removed from AC source, connect an electrical jumper across the two AC plug prongs. Place the AC switch in the on position, connect one lead of ohm-meter to the AC plug prongs tied together and touch other ohm-meter lead in turn to each exposed metallic parts such as antenna terminals, phone jacks, etc.
If the exposed metallic part has a return path to the chassis, the measured resistance should be between 1 MΩ and 5.2 MΩ.
When the exposed metal has no return path to the chassis the reading must be infinite.
An other abnormality exists that must be corrected before the receiver is returned to the customer.

Leakage Current Hot Check (See below Figure)
Plug the AC cord directly into the AC outlet.

Do not use a line Isolation Transformer during this check.
Connect 1.5 K / 10 watt resistor in parallel with a 0.15 uF capacitor between a known good earth ground (Water Pipe, Conduit, etc.) and the exposed metallic parts.
Measure the AC voltage across the resistor using AC voltmeter with 1000 ohms/volt or more sensitivity.
Reverse plug the AC cord into the AC outlet and repeat AC voltage measurements for each exposed metallic part. Any voltage measured must not exceed 0.75 volt RMS which is corresponds to 0.5 mA.
In case any measurement is out of the limits specified, there is possibility of shock hazard and the set must be checked and repaired before it is returned to the customer.

Leakage Current Hot Check circuit



When 25A is impressed between Earth and 2nd Ground for 1 second, Resistance must be less than 0.1 Ω
*Base on Adjustment standard

SPECIFICATION

NOTE : Specifications and others are subject to change without notice for improvement.

1. Application range

This specification is applied to the LCD TV used LD12B chassis.

2. Requirement for Test

Each part is tested as below without special appointment.

1) Temperature: 25 ºC ± 5 ºC(77 ºF ± 9 ºF), CST: 40 ºC ± 5 ºC
2) Relative Humidity : 65 % ± 10 %
3) Power Voltage : Standard input voltage (AC 100-240 V~, 50 / 60 Hz)
   * Standard Voltage of each products is marked by models.
4) Specification and performance of each parts are followed each drawing and specification by part number in accordance with BOM.
5) The receiver must be operated for about 5 minutes prior to the adjustment.

3. Test method

1) Performance: LGE TV test method followed
2) Demanded other specification
   - Safety : CE, IEC specification
   - EMC :CE, IEC

4. Model General Specification

No.	Item	Specification	Remarks
1	Market	EU(PAL Market-36Countries)	**DTV & Analog (Total 36 countries)** **DTV (MPEG2/4, DVB-T)** : 31 countries (England/Italy/Germany/France/Spain/Sweden/Finland/Netherlands/Belgium/Luxemburg/ Greece/Denmark/Czech/Austria /Hungary/Swiss/Croatia/Turkey/Norway/Slovenia/Poland/ Ukraine/Portugal/Ireland/Moroco/Latvia/Estonia/Lithania/Rumania/Russia/Slovakia) **DTV (MPEG2/4, DVB-T2)**: 5 countries (England/Sweden/Finland/Denmark/Norway) **DTV (MPEG2/4, DVB-C)**: 10 countries (Sweden/Finland/Denmark/Norway/Austria/Swiss/Germany/Netherlands/Hungary/Slovenia) **Analog Only** - 5 countries (Bosnia/Serbia/Bulgaria/Albania/Kazakhstan) **Supported satellite : 22 satellites** HISPASAT 1C/1D, ATLANTIC BIRD 2, NILESAT 101/102, ATLANTIC BIRD 3, AMOS 2/3, THOR 5/6, IRIUS 4, EUTELSAT-W3A, EUROBIRD 9A, EUTELSAT-W2A, HOTBIRD 6/8/9, EUTELSAT-SESAT, ASTRA 1L/H/M/KR, ASTRA 3A/3B, BADR 4/6, ASTRA 2D, EUROBIRD 3, EUTELSAT-W7, HELLASSAT 2, EXPRESS AM1, TURKSAT 2A/3A, INTERSAT10
2	Broadcasting system	1) PAL-BG 2) PAL-DK 3) PAL-I/I' 4) SECAM L/L' 5) DVB-T/C 6) DVB-T2 7) DVB-S	- DVB-T2/S is supported in specific models. 1. DVB-T2 : Model name : xxxxxxxT 2. DVB-S : Model name : xxxxxxxS - SECAM L/L' is not supported in DVB-T2 models.

No.	Item	Specification	Remarks
3	Receiving system	Analog : Upper Heterodyne Digital : COFDM , QAM	► **DVB-T** - Guard Interval(Bitrate_Mbit/s) 1/4, 1/8, 1/16, 1/32 - Modulation : Code Rate QPSK : 1/2, 2/3, 3/4, 5/6, 7/8 16-QAM : 1/2, 2/3, 3/4, 5/6, 7/8 64-QAM : 1/2, 2/3, 3/4, 5/6, 7/8 ► **DVB-C** - Symbolrate : 4.0Msymbols/s to 7.2Msymbols/s - Modulation : 16QAM, 64-QAM, 128-QAM and 256-QAM ► **DVB-T2** - Guard Interval(Bitrate_Mbit/s) 1/4,1/8,1/16,1/32,1/128,19/128,19/256, - Modulation : Code Rate QPSK : 1/2, 2/5, 2/3, 3/4, 5/6 16-QAM : 1/2, 2/5, 2/3, 3/4, 5/6 64-QAM : 1/2, 2/5, 2/3, 3/4, 5/6 256-QAM : 1/2, 2/5, 2/3, 3/4, 5/6 ► **DVB-S** - Symbolrate DVB-S2 (8PSK / QPSK) : 2 ~ 45Msymbol/s DVB-S (QPSK) : 2 ~ 45Msymbol/s - viterbi DVB-S mode : 1/2, 2/3, 3/4, 5/6, 7/8 DVB-S2 mode : 1/2, 2/3, 3/4, 3/5, 4/5, 5/6, 8/9, 9/10
4	Scart Jack (1EA)	PAL, SECAM	Scart Jack is Full scart and support RF-OUT(analog & DTV) Not support DTV Auto AV.
5	Video Input RCA(1EA)	PAL, SECAM, NTSC	4System : PAL, SECAM, NTSC, PAL60
6	Component Input(1EA)	Y/Cb/Cr, Y/Pb/Pr	
7	RGB Input	RGB-PC	Analog(D-SUB 15PIN)
8	HDMI Input (3EA)	HDMI1-DTV (DVI) HDMI2-DTV HDMI3-DTV	PC(HDMI version 1.3) Support HDCP
9	Audio Input (3EA)	RGB/DVI Audio, Component, AV	L/R Input
10	SDPIF out (1EA)	SPDIF out	
11	Earphone out (1EA)	Antenna, AV1, AV2, AV3, Component, RGB, HDMI1, HDMI2, HDMI3, USB	
12	USB (1EA)	EMF For Service (download)	JPEG, MP3
		DivX HD	

5. Component Video Input (Y, C_B/P_B, C_R/P_R)

No.	Specification				Remark
	Resolution	H-freq(kHz)	V-freq(Hz)		
1.	720x480	15.73	60.00	SDTV,DVD 480i	
2.	720x480	15.63	59.94	SDTV,DVD 480i	
3.	720x480	31.47	59.94	480p	
4.	720x480	31.50	60.00	480p	
5.	720x576	15.625	50.00	SDTV,DVD 625 Line	
6.	720x576	31.25	50.00	HDTV 576p	
7.	1280x720	45.00	50.00	HDTV 720p	
8.	1280x720	44.96	59.94	HDTV 720p	
9.	1280x720	45.00	60.00	HDTV 720p	
10.	1920x1080	31.25	50.00	HDTV 1080i	
11.	1920x1080	33.75	60.00	HDTV 1080i	
12.	1920x1080	33.72	59.94	HDTV 1080i	
13.	1920x1080	56.250	50	HDTV 1080p	
14.	1920x1080	67.5	60	HDTV 1080p	

6. RGB Input (PC)

No.	Specification				Proposed	Remarks
	Resolution	H-freq(kHz)	V-freq(Hz)	Pixel Clock(MHz)		
1.	720*400	31.468	70.08	28.321		For only DOS mode
2.	640*480	31.469	59.94	25.17	VESA	Input 848*480 60 Hz, 852*480 60 Hz -> 640*480 60 Hz Display
3.	800*600	37.879	60.31	40.00	VESA	
4.	1024*768	48.363	60.00	65.00	VESA(XGA)	
5.	1360*768	47.72	59.8	84.75	WXGA	
6.	1920*1080	66.587	59.93	138.625	WUXGA	FHD model

7. HDMI Input

(1) DTV Mode

No.	Resolution	H-freq(kHz)	V-freq.(Hz)	Pixel clock(MHz)	Proposed	Remark
1.	720*480	31.469 / 31.5	59.94 / 60	27.00 / 27.03	SDTV 480P	
2.	720*576	31.25	50	54	SDTV 576P	
3.	1280*720	37.500	50	74.25	HDTV 720P	
4.	1280*720	44.96 / 45	59.94 / 60	74.17 / 74.25	HDTV 720P	
5.	1920*1080	33.72 / 33.75	59.94 / 60	74.17 / 74.25	HDTV 1080I	
6.	1920*1080	28.125	50.00	74.25	HDTV 1080I	
7.	1920*1080	26.97 / 27	23.97 / 24	74.17 / 74.25	HDTV 1080P	
8.	1920*1080	33.716 / 33.75	29.976 / 30.00	74.25	HDTV 1080P	
9.	1920*1080	56.250	50	148.5	HDTV 1080P	
10.	1920*1080	67.43 / 67.5	59.94 / 60	148.35 / 148.50	HDTV 1080P	

(2) PC Mode

No.	Resolution	H-freq(kHz)	V-freq.(Hz)	Pixel clock(MHz)	Proposed	Remark
1.	720*400	31.468	70.08	28.321		HDCP
2.	640*480	31.469	59.94	25.17	VESA	HDCP
3.	800*600	37.879	60.31	40.00	VESA	HDCP
4.	1024*768	48.363	60.00	65.00	VESA(XGA)	HDCP
5.	1360*768	47.72	59.8	84.75	WXGA	HDCP
6.	1280*1024	63.595	60.0	108.875	SXGA	HDCP/FHD model
7.	1920*1080	67.5	60.00	138.625	WUXGA	HDCP/FHD model

ADJUSTMENT INSTRUCTION

1. Application Range

This specification sheet is applied to all of the LCD TV with LD12B chassis.

2. Designation

(1) Because this is not a hot chassis, it is not necessary to use an isolation transformer. However, the use of isolation transformer will help protect test instrument.
(2) Adjustment must be done in the correct order.
(3) The adjustment must be performed in the circumstance of 25 ºC ± 5 ºC of temperature and 65 % ± 10 % of relative humidity if there is no specific designation.
(4) The input voltage of the receiver must keep AC 100-240 V~, 50 / 60Hz.
(5) The receiver must be operated for about 5 minutes prior to the adjustment when module is in the circumstance of over 15.

In case of keeping module is in the circumstance of 0 °C, it should be placed in the circumstance of above 15 °C for 2 hours

In case of keeping module is in the circumstance of below -20 °C, it should be placed in the circumstance of above 15 °C for 3 hours.

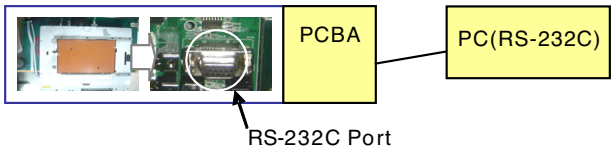
[Caution]
When still image is displayed for a period of 20 minutes or longer (especially where W/B scale is strong. Digital pattern 13ch and/or Cross hatch pattern 09ch), there can some afterimage in the black level area.

3. Automatic Adjustment

3.1. MAC Address

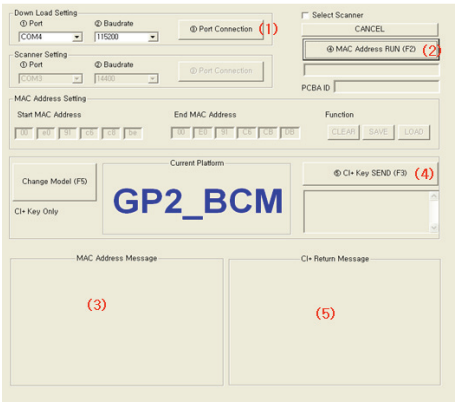
(1) Equipment & Condition
- Play file: Serial.exe
- MAC Address edit
- Input Start / End MAC address

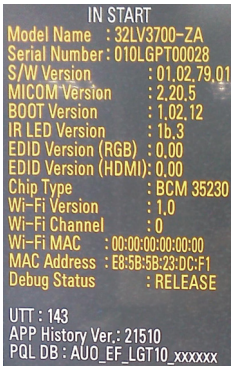
(2) Download method
1) Communication Prot connection

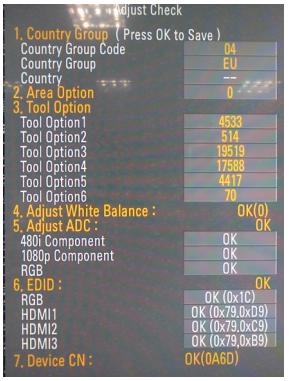


Connect: PCBA Jig-> RS-232C Port== PC-> RS-232C Port

2) MAC Address & CI+ key Download
- Set CI+ key path Directory at start Mac & CI Download Program
- Com 1,2,3,4 and 115200(Baud rate)
- Port connection button click(1)
- Push the (2) MAC Address write.
- At success Download, check the OK(3).
- Start CI+ Download, Push the (4).
- Check the OK or NG.(5)

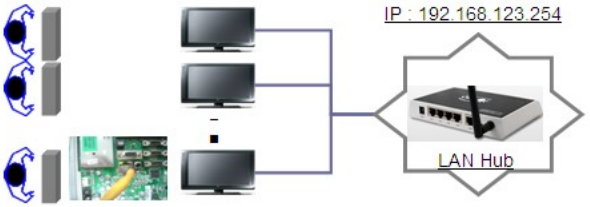




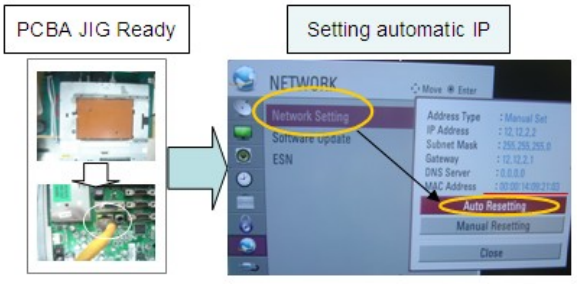


3.2. LAN

(1) Equipment & Condition
■ Each other connection to LAN Port of IP Hub and Jig



(2) LAN inspection solution
■ LAN Port connection with PCB
■ Network setting at MENU Mode of TV
■ setting automatic IP
■ Setting state confirmation
-> If automatic setting is finished, you confirm IP and MAC Address.



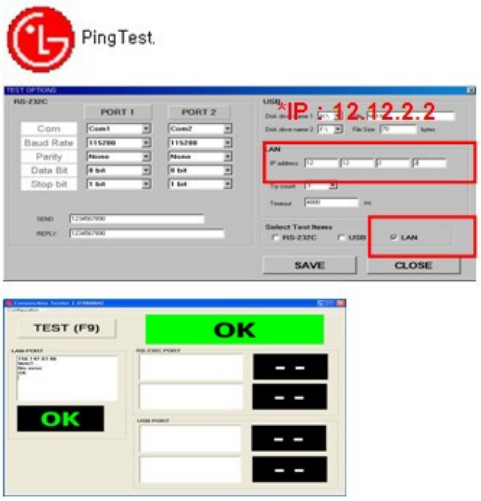
3.3. LAN PORT INSPECTION(PING TEST)

Connect SET -> LAN port == PC -> LAN Port.

SET —— PC

(1) Equipment setting
1) Play the LAN Port Test PROGRAM.
2) Input IP set up for an inspection to Test Program.
*IP Number : 12.12.2.2

(2) LAN PORT inspection (PING TEST)
1) Play the LAN Port Test Program.
2) Connect each other LAN Port Jack.
3) Play Test (F9) button and confirm OK Message.
4) Remove LAN CABLE.

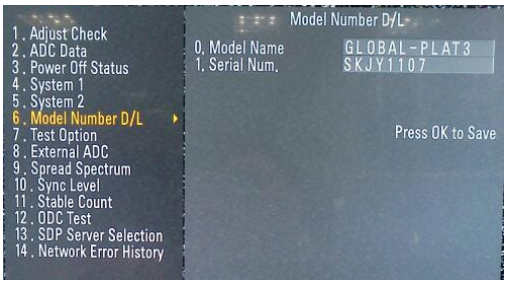


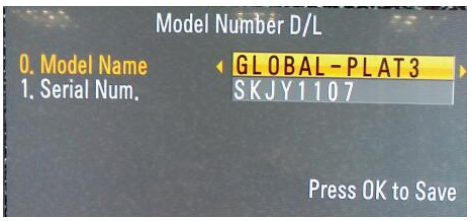
3.4. Model name & serial number download

(1) Model name & Serial number D/L
■ Press “Power on” key of service remote control. (Baud rate : 115200 bps)
■ Connect RS232 Signal Cable to RS-232 Jack.
■ Write Serial number by use RS-232.
■ Must check the serial number at Instart menu.

(2) Method & notice
A. Serial number D/L is using of scan equipment.
B. Setting of scan equipment operated by Manufacturing Technology Group.
C. Serial number D/L must be conformed when it is produced in production line, because serial number D/L is mandatory by D-book 4.0.

* Manual Download (Model Name and Serial Number)
If the TV set is downloaded by OTA or service man, sometimes model name or serial number is initialized.(Not always)
There is impossible to download by bar code scan, so It need Manual download.
a. Press the ‘instart’ key of ADJ remote control.
b. Go to the menu ‘5.Model Number D/L’ like below photo.
c. Input the Factory model name(ex 42LD450-ZA) or Serial number like photo.





d. Check the model name Instart menu. -> Factory name displayed. (ex 32LV3700-ZA)
e. Check the Diagnostics.(DTV country only) -> Buyer model displayed. (ex 32LV3700)

4. Manual Adjustment

4.1. EDID(The Extended Display Identification Data)/DDC(Display Data Channel) download

(1) Overview
It is a VESA regulation. A PC or a MNT will display an optimal resolution through information sharing without any necessity of user input. It is a realization of “Plug and Play”.

(2) Equipment
- Adjustment remote control
- Since embedded EDID data is used, EDID download JIG, HDMI cable and D-sub cable are not need.

(3)Download method
1) Press ADJ key on the Adjustment remote control, then select “12.EDID D/L”, by pressing Enter key, enter EDID D/L menu.
2) Select [Start] button by pressing Enter key, HDMI1/ HDMI2/ HDMI3/ RGB are Writing and display OK or NG.

(4) EDID DATA
■ HDMI

	0x00	0x01	0x02	0x03	0x04	0x05	0x06	0x07	0x08	0x09	0x0A	0x0B	0x0C	0x0D	0x0E	0x0F
0x00	00	FF	FF	FF	FF	FF	FF	00	1E	6D	ⓐ		ⓑ			
0x01	ⓒ		01	03	80	10	09	78	0A	EE	91	A3	54	4C	99	26
0x02	0F	50	54	A1	08	00	71	40	81	C0	81	00	81	80	95	00
0x03	90	40	A9	C0	B3	00	02	3A	80	18	71	38	2D	40	58	2C
0x04	45	00	A0	5A	00	00	00	1E	66	21	50	B0	51	00	1B	30
0x05	40	70	36	00	A0	5A	00	00	00	1E	00	00	00	FD	00	39
0x06	3F	1F	52	10	00	0A	20	20	20	20	20	20	ⓓ			
0x07	ⓓ														01	ⓔ1
0x00	02	03	26	F1	4E	10	1F	84	13	05	14	03	02	12	20	21
0x01	22	15	01	26	15	07	50	09	57	07	67	ⓕ				
0x02	ⓕ		E3	05	03	01	01	1D	80	18	71	1C	16	20	58	2C
0x03	25	00	A0	5A	00	00	00	9E	01	1D	00	80	51	D0	1A	20
0x04	6E	88	55	00	A0	5A	00	00	00	1A	02	3A	80	18	71	38
0x05	2D	40	58	2C	45	00	A0	5A	00	00	00	1E	66	21	50	B0
0x06	51	00	1B	30	40	70	36	00	A0	5A	00	00	00	1E	00	00
0x07	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	ⓔ2

■ RGB

	0x00	0x01	0x02	0x03	0x04	0x05	0x06	0x07	0x08	0x09	0x0A	0x0B	0x0C	0x0D	0x0E	0x0F
0x00	00	FF	FF	FF	FF	FF	FF	00	1E	6D	ⓐ		ⓑ			
0x01	ⓒ		01	03	68	10	09	78	0A	EE	91	A3	54	4C	99	26
0x02	0F	50	54	A1	08	00	71	4F	01	01	01	01	01	01	95	00
0x03	90	40	A9	C0	B3	00	02	3A	80	18	71	38	2D	40	58	2C
0x04	45	00	A0	5A	00	00	00	1E	66	21	50	B0	51	00	1B	30
0x05	40	70	36	00	A0	5A	00	00	00	1E	00	00	00	FD	00	3A
0x06	3E	1E	53	10	00	0A	20	20	20	20	20	20	ⓓ			
0x07	ⓓ														01	ⓔ3

■ Reference
- HDMI1 ~ HDMI3 / RGB
- In the data of EDID, bellows may be different by S/W or Input mode.

ⓐ Product ID

Model Name	HEX	EDID Table	DDC Function
ALL	0001	0100	Analog
	0001	0100	Digital

ⓑ Serial No. : Controlled on product line

ⓒ Month, Year: Controlled on production line:
ex) Monthly : '01' -> '01'
Year : '2010' -> '14'

ⓓ Model Name(Hex):

MODEL	MODEL NAME(HEX)
all	00 00 00 FC 00 4C 47 20 54 56 0A 20 20 20 20 20 20 20

ⓔ Checksum: Changeable by total EDID data.

INPUT	ⓔ1	ⓔ2	ⓔ3
HDMI1	7F	D9	X
HDMI2	7F	C9	X
HDMI3	7F	B9	X
RGB	X	X	98

ⓕ Vendor Specific(HDMI)

INPUT	MODEL NAME(HEX)
HDMI1	67 03 0C 00 10 00 B8 2D
HDMI2	67 03 0C 00 20 00 B8 2D
HDMI3	67 03 0C 00 30 00 B8 2D
RGB	67 03 0C 00 40 00 B8 2D

4.2. White Balance Adjustment

4.2.1. Overview

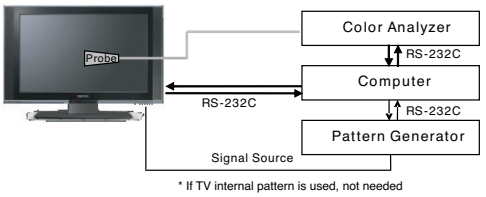
(1) W/B adj. Objective & How-it-works
(2) Objective: To reduce each Panel's W/B deviation
(3) How-it-works : When R/G/B gain in the OSD is at 192, it means the panel is at its Full Dynamic Range. In order to prevent saturation of Full Dynamic range and data, one of R/G/B is fixed at 192, and the other two is lowered to find the desired value.
(4) Adj. condition : normal temperature
1) Surrounding Temperature : 25 ºC ± 5 ºC
2) Warm-up time: About 5 Min
3) Surrounding Humidity : 20 % ~ 80 %

4.2.2 Equipment

1) Color Analyzer: CA-210 (LED Module : CH 14)
2) Adj. Computer(During auto adj., RS-232C protocol is needed)
3) Adjustment remote control
4) Video Signal Generator MSPG-925F 720p/204-Gray (Model:217, Pattern:49)
-> Only when internal pattern is not available

■ Color Analyzer Matrix should be calibrated using CS-1000.

4.2.3. Equipment connection MAP



4.2.4. Adj. Command (Protocol)

START | 6E | A | 50 | A | LEN | A | 03 | A | CMD | A | 00 | A | VAL | A | CS | A | STOP

<Command Format>
- LEN: Number of Data Byte to be sent
- CMD: Command
- VAL: FOS Data value
- CS: Checksum of sent data
- A: Acknowledge
Ex) [Send: JA_00_DD] / [Ack: A_00_okDDX]

■ RS-232C Command used during auto-adj.

RS-232C COMMAND [CMD	ID	DATA]	Explanation
wb	00	00	Begin White Balance adj.
wb	00	10	Gain adj.(internal white pattern)
wb	00	1f	Gain adj. completed
wb	00	20	Offset adj.(internal white pattern)
wb	00	2f	Offset adj. completed
wb	00	ff	End White Balance adj.(Internal pattern disappears)

Ex) wb 00 00 -> Begin white balance auto-adj.
wb 00 10 -> Gain adj.
ja 00 ff -> Adj. data
jb 00 c0
...
...
wb 00 1f -> Gain adj. completed
*(wb 00 20(Start), wb 00 2f(completed)) -> Off-set adj.
wb 00 ff -> End white balance auto-adj.

■ Adj. Map

	ITEM	Command		Data Range(Hex.)		Default(Decimal)
		Cmd 1	Cmd 2	Min	Max	
Cool	R-Gain	j	g	00	C0	
	G-Gain	j	h	00	C0	
	B-Gain	j	i	00	C0	
	R-Cut					
	G-Cut					
	B-Cut					
Medium	R-Gain	j	a	00	C0	
	G-Gain	j	b	00	C0	
	B-Gain	j	c	00	C0	
	R-Cut					
	G-Cut					
	B-Cut					
Warm	R-Gain	j	d	00	C0	
	G-Gain	j	e	00	C0	
	B-Gain	j	f	00	C0	
	R-Cut					
	G-Cut					

■ 3 Command White Balance Adj. Map

	Command (lower case ASCII)		SetID	R Gain(HEX)		G Gain(HEX)		B Gain(HEX)	
	CMD1	CMD2		MIN	MAX	MIN	MAX	MIN	MAX
Cool	j	j	00	00	C0	00	C0	00	C0
Medium	j	k	00	00	C0	00	C0	00	C0
Warm	j	l	00	00	C0	00	C0	00	C0

■ Infrared Sensor Adj. Map

	Command (lower case ASCII)		R Gain(HEX)		G Gain(HEX)		B Gain(HEX)	
	CMD1	CMD2	MIN	MAX	MIN	MAX	MIN	MAX
Cool	1	C	00	C0	00	C0	00	C0
Medium	1	D	00	C0	00	C0	00	C0
Warm	1	E	00	C0	00	C0	00	C0

4.2.5. Adj. method

(1) Auto adj. method
1) Set TV in adj. mode using POWER ON key.
2) Zero calibrate probe then place it on the center of the Display.
3) Connect Cable (RS-232C)
4) Select mode in adj. Program and begin adjustment.
5) When adj. is completed(OK Sign), check adj. status pre mode. (Warm, Medium, Cool)
6) Remove probe and RS-232C cable to complete adj..

■ W/B Adj. must begin as start command “wb 00 00” , and finish as end command “wb 00 ff”, and Adj. offset if need.

(2) Manual adj. method
1) Set TV in Adj. mode using POWER ON.
2) Zero Calibrate the probe of Color Analyzer, then place it on the center of LCD module within 10cm of the surface.
3) Press ADJ key -> EZ adjust using adjustment remote control -> 9.White-Balance then press the cursor to the right key (►).(When key(►) is pressed 216 Gray internal pattern will be displayed.)
4) One of R Gain / G Gain / B Gain should be fixed at 192, and the rest will be lowered to meet the desired value.
5) Adjustment is performed in COOL, MEDIUM, WARM 3 modes of color temperature.

■ If internal pattern is not available, use RF input. In EZ Adj. menu 9.White Balance, you can select one of 2 Test -pattern: ON, OFF. Default is inner(ON). By selecting OFF, you can adjust using RF signal in 216 gray pattern.

■ Adj. condition and cautionary items
1) Lighting condition in surrounding area
Surrounding lighting should be lower 10 lux. Try to isolate adj. area into dark surrounding.
2) Probe location
: Color Analyzer(CA-210) probe should be within 10 cm and perpendicular of the module surface.(80°~100°)
3) Aging time
- After Aging Start, Keep the Power ON status during 5 Minutes.
- In case of LCD, Back-light on should be checked using no signal or Full-white pattern.

4.2.6. Reference (White Balance Adj. coordinate and temperature)

■ Luminance : 204 Gray
■ Standard color coordinate and temperature using CS-1000 (over 26 inch)

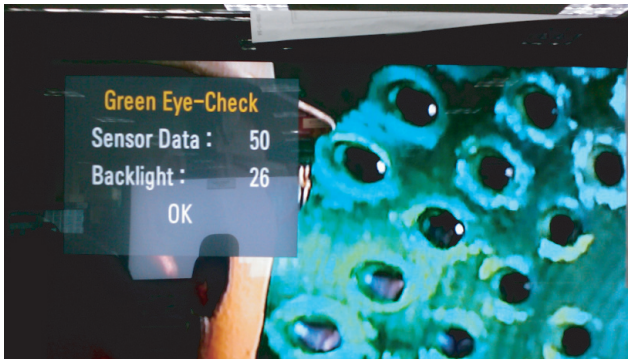
Mode	Color Coordination		Temp	ΔUV
	x	y		
COOL	0.269	0.273	13000 K	0.0000
MEDIUM	0.285	0.293	9300 K	0.0000
WARM	0.313	0.329	6500 K	0.0000

■ Standard color coordinate and temperature using CA-210 (CH 14)

Mode	Color Coordination		Temp	ΔUV
	x	y		
COOL	0.269 ± 0.002	0.273 ± 0.002	13000 K	0.0000
MEDIUM	0.285 ± 0.002	0.293 ± 0.002	9300 K	0.0000
WARM	0.313 ± 0.002	0.329 ± 0.002	6500 K	0.0000

4.3. EYE-Q function check

Step 1) Turn on TV.
Step 2) Press EYE key of Adjustment remote control.
Step 3) Cover the Eye Q II sensor on the front of the using your hand and wait for 6 seconds.
Step 4) Confirm that R/G/B value is lower than 10 of the “Raw Data (Sensor data, Back light)”. If after 6 seconds, R/G/B value is not lower than 10, replace Eye Q II sensor.
Step 5) Remove your hand from the Eye Q II sensor and wait for 6 seconds.
Step 6) Confirm that “ok” pop up. If change is not seen, replace Eye Q II sensor.



4.4. Option selection per country

(1) Overview
- Option selection is only done for models in Non-EU.
- Applied model: LD12B Chassis applied EU model.

(2) Method
1) Press ADJ key on the Adj. Remote Control, then select Country Group Menu.
2) Depending on destination, select Country Group Code 04 or Country Group EU then on the lower Country option, select US, CA, MX. Selection is done using +, - or ▶◀ key.

5. Tool Option selection

- Method : Press ADJ key on the Adjustment remote control, then select Tool option.

6. Ship-out mode check(In-stop)

After final inspection, press IN-STOP key of the Adjustment remote control and check that the unit goes to Stand-by mode.

7. GND and Internal Pressure check

7.1. Method

1) GND & Internal Pressure auto-check preparation
- Check that Power Cord is fully inserted to the SET. (If loose, re-insert)

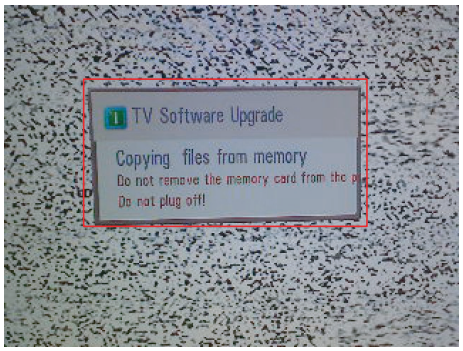
2) Perform GND & Internal Pressure auto-check
- Unit fully inserted Power cord, Antenna cable and A/V arrive to the auto-check process.
- Connect D-terminal to AV JACK TESTER.
- Auto CONTROLLER(GWS103-4) ON
- Perform GND TEST.
- If NG, Buzzer will sound to inform the operator.
- If OK, changeover to I/P check automatically. (Remove CORD, A/V form AV JACK BOX.)
- Perform I/P test.
- If NG, Buzzer will sound to inform the operator.
- If OK, Good lamp will lit up and the stopper will allow the pallet to move on to next process.

7.2. Checkpoint

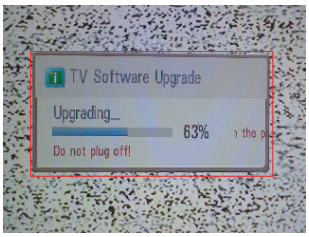
• TEST voltage
- GND: 1.5 KV/min at 100 mA
- SIGNAL: 3 KV/min at 100 mA
• TEST time: 1 second
• TEST POINT
- GND TEST = POWER CORD GND & SIGNAL CABLE METAL GND
- Internal Pressure TEST = POWER CORD GND & LIVE & NEUTRAL
• LEAKAGE CURRENT: At 0.5 mArms

8. USB S/W download(option, service only)

1) Put the USB Stick to the USB socket.
2) Automatically detecting update file in USB Stick
   - If your downloaded program version in USB Stick is Low, it didn't work. But your downloaded version is High, USB data is automatically detecting.
3) Show the message "Copying files from memory".



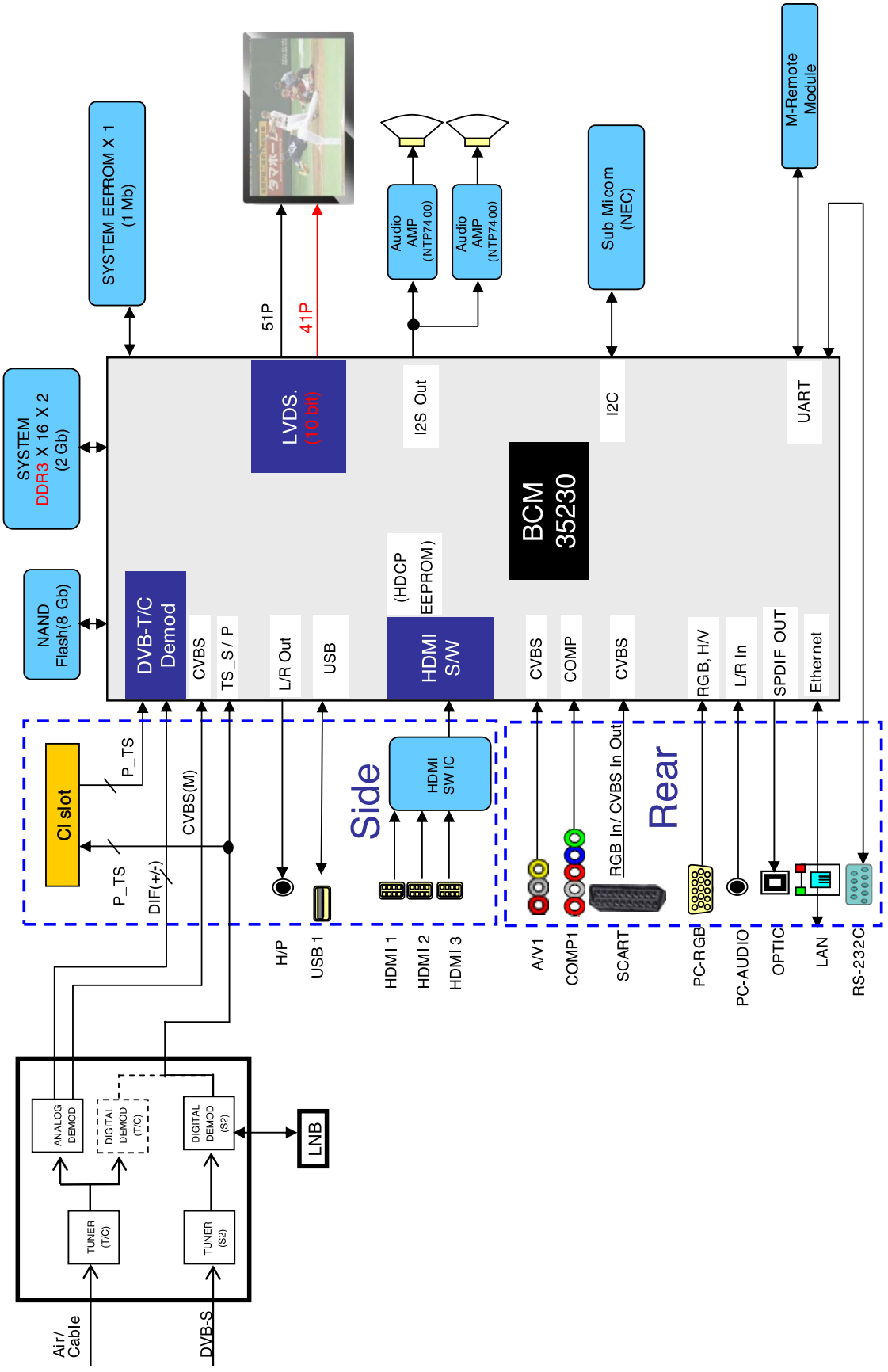
4) Updating is starting.



5) Updating Completed, the TV will restart automatically.
6) If your TV is turned on, check your updated version and Tool option. (explain the Tool option, next stage)
   * If downloading version is more high than your TV have, TV can lost all channel data. In this case, you have to channel recover. if all channel data is cleared, you didn't have a DTV/ATV test on production line.

* After downloading, have to adjust TOOL OPTION again.
  1) Push "IN-START" key in service remote control.
  2) Select "Tool Option 1" and Push "OK" key.
  3) Punch in the number. (Each model has their number.)

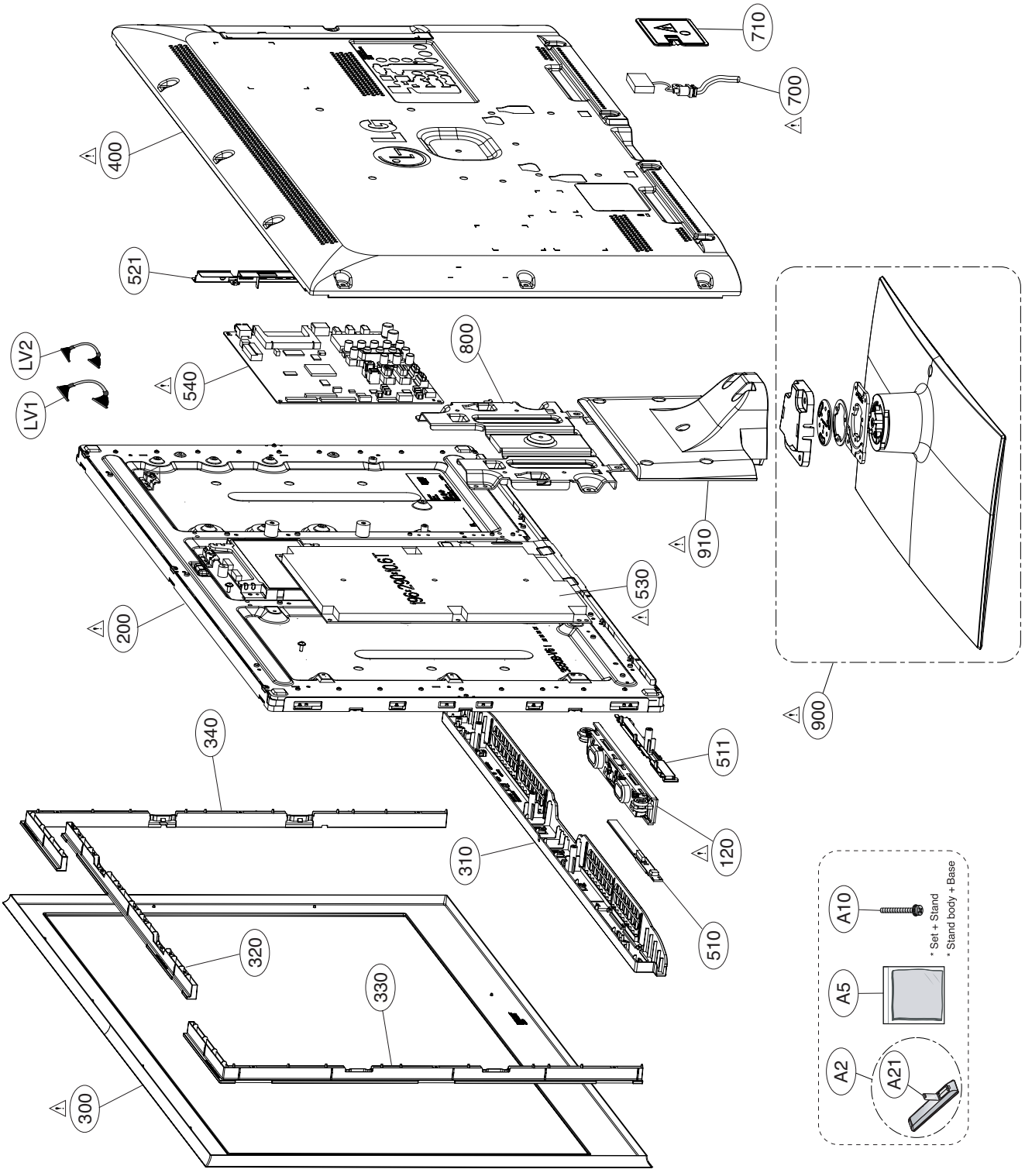
BLOCK DIAGRAM



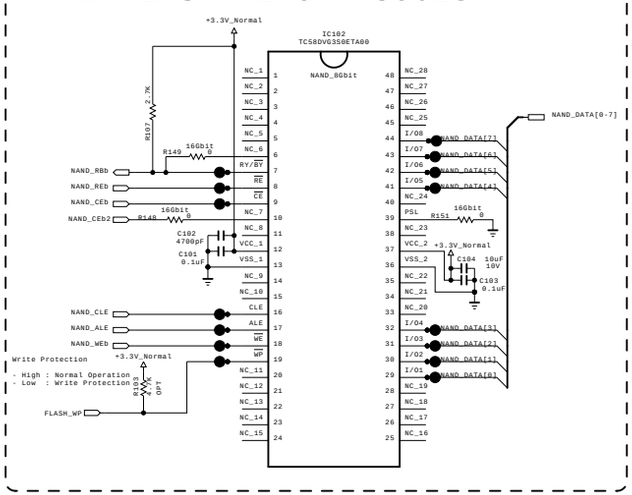
EXPLODED VIEW

IMPORTANT SAFETY NOTICE

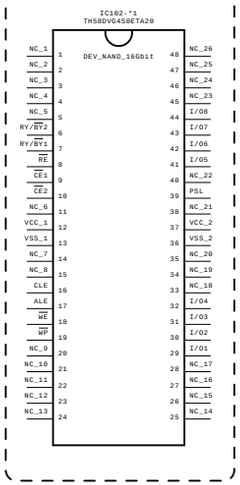
Many electrical and mechanical parts in this chassis have special safety-related characteristics. These parts are identified by ⚠ in the Schematic Diagram and EXPLODED VIEW.
It is essential that these special safety parts should be replaced with the same components as recommended in this manual to prevent X-RADIATION, Shock, Fire, or other Hazards.
Do not modify the original design without permission of manufacturer.



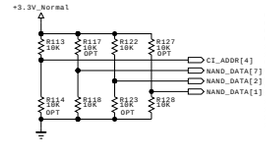
NAND FLASH MEMORY 8Gbit



16Gbit

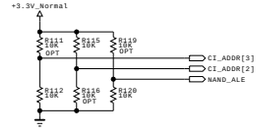


Boot ROM Device Select - (FA4,FAD7,FAD2,FAD1)



0000: ST Micro M25P or compatible Serial Flash
0010: 8-bit 512Mbit 512B page SLC NAND Flash devices
0100: 8-bit 128, 256Mbit 512B page SLC NAND Flash devices
0110: 8-bit 1Gbit 2KB page SLC NAND Flash devices
1000: 8-bit 2Gbit, 4Gbit, 8Gbit 2KB page SLC NAND Flash devices
1010: 8-bit 16Gbit, 32Gbit 4KB page SLC NAND Flash devices (O)
0001: 8-bit 8/16/32Gbit 2KB page MLC NAND Flash devices
0011: 8-bit 16/32Gbit 4KB page MLC NAND Flash devices
0101: 8-bit 32Gbit 8KB page MLC NAND Flash devices
0111: 3B dual IO Serial Flash
1001: 8B dual IO Serial Flash
1011: fast Serail Flash > 50Mhz
1100: OneNAND Flash (always 16-bit)
1110: Reserved
1101, 1111: Reserved

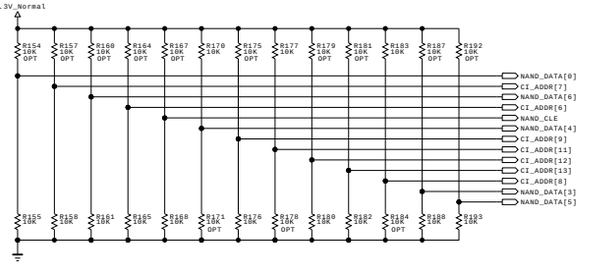
NAND ECC (FA3, FA2, FALE)



000 = ECC disabled
001 = ECC 1-bit repair
010 = ECC 4-bit BCH (O)
011 = ECC 8-bit BCH, 27 byte spare
100 = ECC 12-bit BCH, 27 byte spare
101 = ECC 8-bit BCH, 16 byte spare
110, 111 = Reserved

DUAL COMPONENT	
IC102	1ST : EAN61000101 2ND : T-TH58DVG4S0ETA20
IC102-*1	

Strap Setting



NAND_DATA[0]:
0: System is LITTLE endian (O)
1: System is BIG endian

CI_ADDR[7]:
0: Disable EDID automatic Downloading from Flash (O)
1: Enable EDID automatic Downloading from Flash

NAND_DATA[6] :
0: Disable OSC clock output on chip Pin (O)
1: Enable OSC clock output on chip pin.

CI_ADDR[6]:
0: Host MIPS run at 500 MHz (O)
1: Host MIPS run at 250 MHz

NAND_CLE:
0: Differential Oscillators TVM not bypassed (O)
1: Differential Oscillators TVM bypassed

NAND_DATA[4]:
0: 27MHz TVM Crystal Frequency
1: 54MHz TVM Crystal Frequency (O)

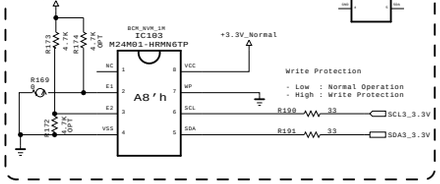
CI_ADDR[9],CI_ADDR[11],CI_ADDR[12],CI_ADDR[13]
TVM Crystal oscillator bias/gain control
0000: 210uA
0001: 390uA
0010: 570uA
0011: 730uA
0100: 890uA (O)
0111: 1290uA
1000: 1416uA
1111: 2196uA
0101, 0110, 1001, 1010, 1011, 1100, 1101, 1110: Reserved

CI_ADDR[8]:
0: RESETOUTb (in On/Off only) stay asserted until software releases them.
1: Fix amount of delay for de-assertion on RESETOUTb (in On/Off only) at end of RESETb pulse (O)

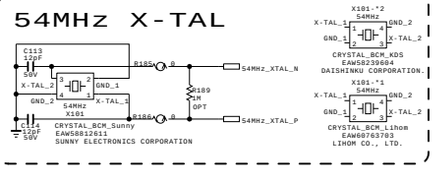
NAND_DATA[3]:
0: MIPS will boot from external flash (O)
1: MIPS will boot from ROM

NAND_DATA[5]:
0: FLASH MODE (O)
1: BSC_SLAVE(8BS) MODE

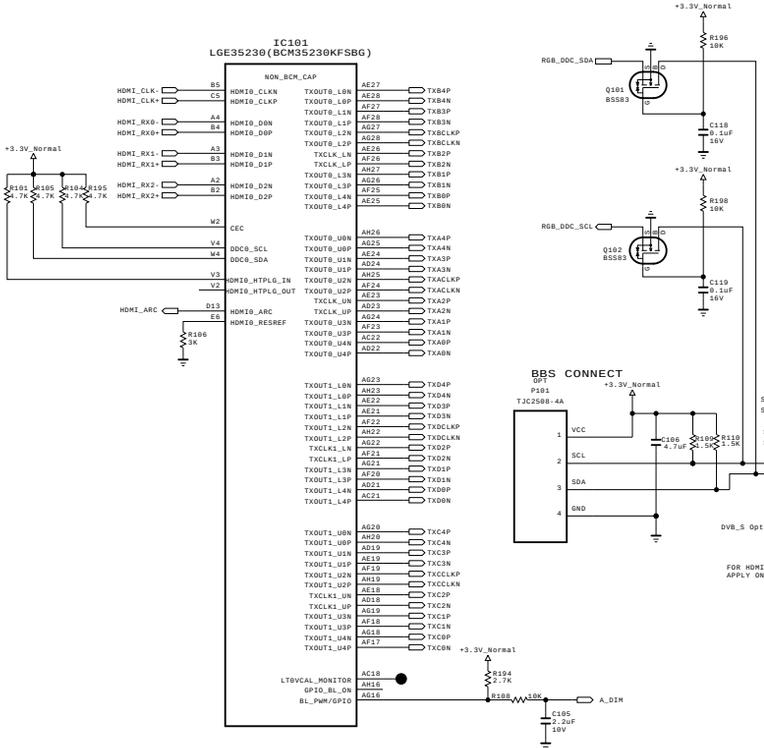
NVRAM



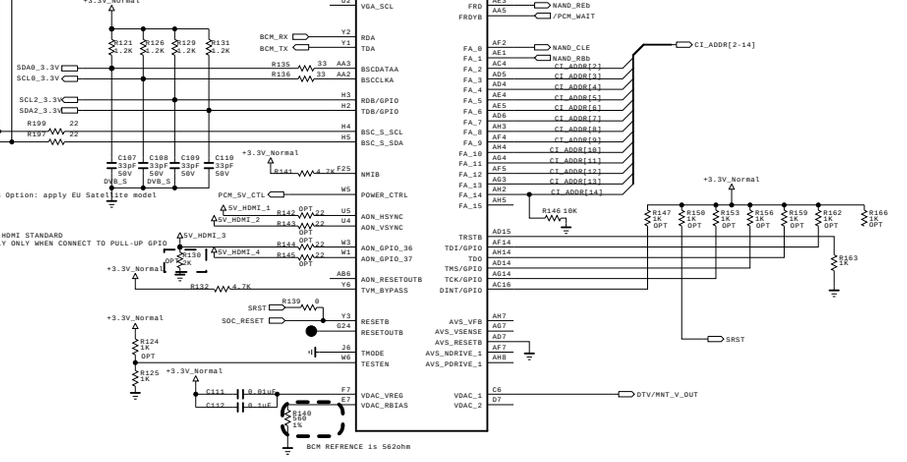
54MHz X-TAL



IC101 LGE35230(BCM35230KFSBG)



BBS CONNECT

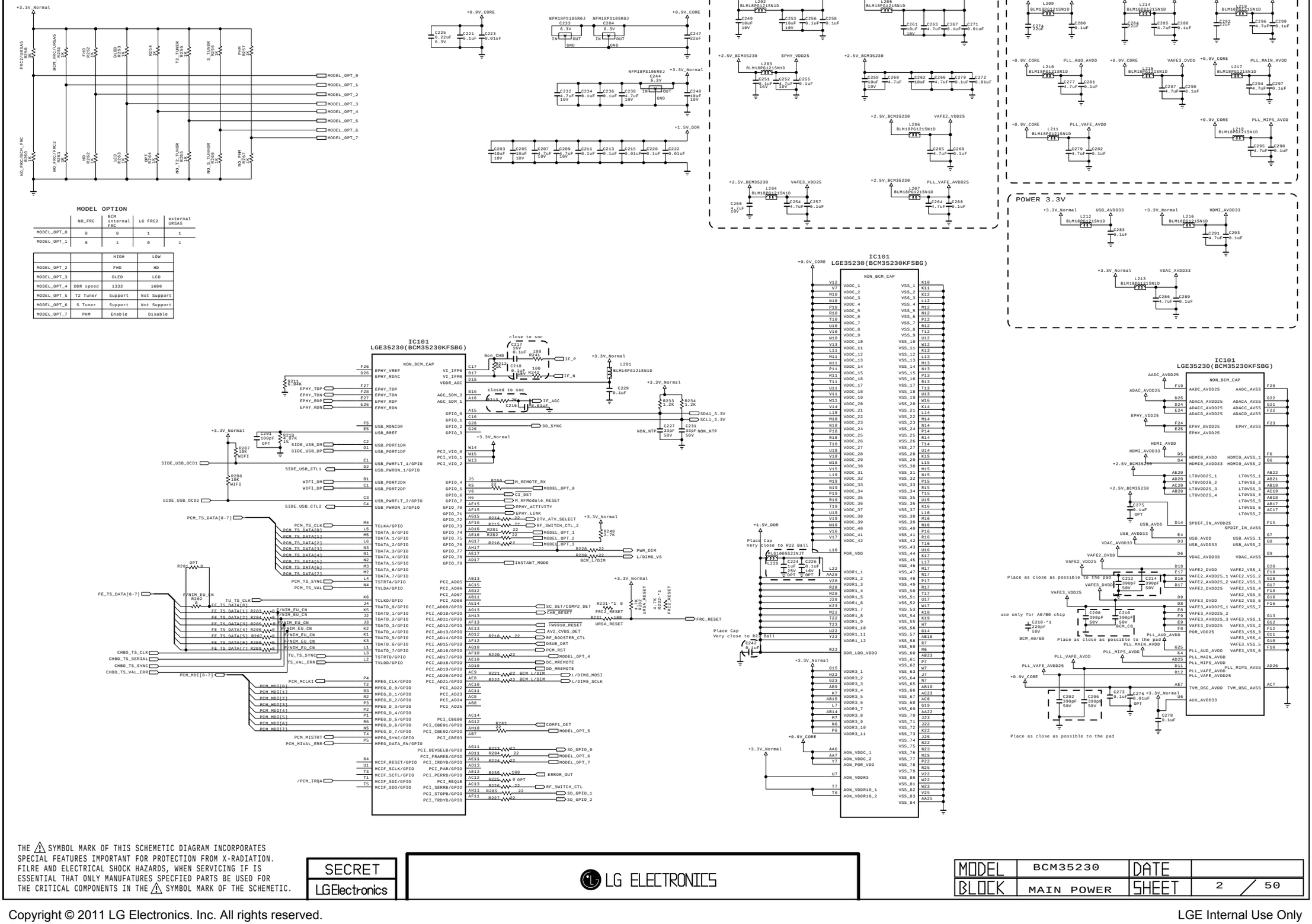


THE ⚠ SYMBOL MARK OF THIS SCHEMETIC DIAGRAM INCORPORATES SPECIAL FEATURES IMPORTANT FOR PROTECTION FROM X-RADIATION. FILRE AND ELECTRICAL SHOCK HAZARDS, WHEN SERVICING IF IS ESSENTIAL THAT ONLY MANUFATURES SPECFIED PARTS BE USED FOR THE CRITICAL COMPONENTS IN THE ⚠ SYMBOL MARK OF THE SCHEMETIC.

SECRET
LGElectronics

LG ELECTRONICS

MODEL	BCM35230	DATE	2010.09.18
BLOCK	MAIN & NAND FLASH	SHEET	1



THE ⚠ SYMBOL MARK OF THIS SCHEMETIC DIAGRAM INCORPORATES SPECIAL FEATURES IMPORTANT FOR PROTECTION FROM X-RADIATION. FILRE AND ELECTRICAL SHOCK HAZARDS, WHEN SERVICING IF IS ESSENTIAL THAT ONLY MANUFATURES SPECFIED PARTS BE USED FOR THE CRITICAL COMPONENTS IN THE ⚠ SYMBOL MARK OF THE SCHEMETIC.

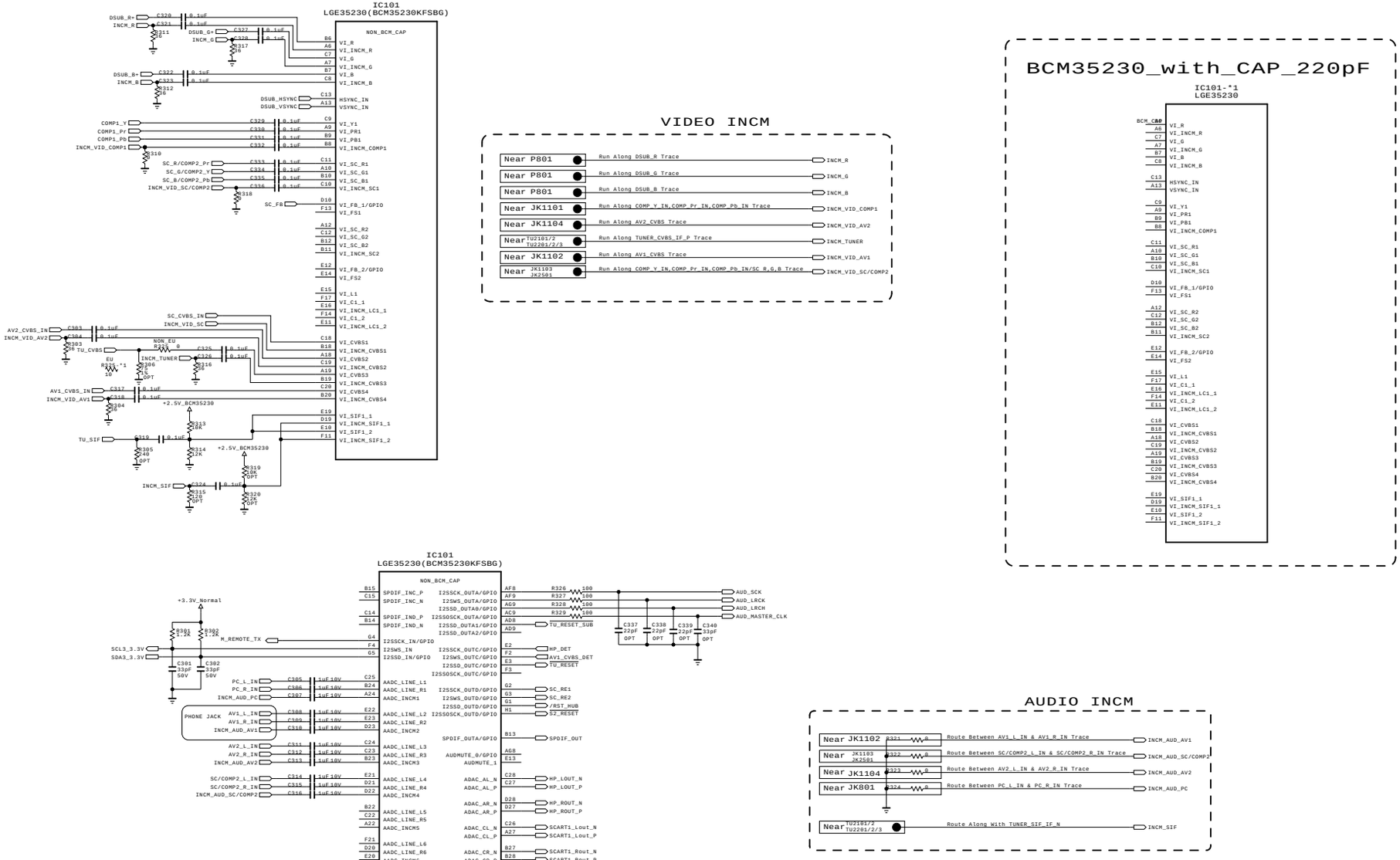
SECRET

LGElectronics

LG ELECTRONICS

MODEL	BCM35230	DATE	
BLOCK	MAIN POWER	SHEET	2 / 50

LGE Internal Use Only



THE ⚠ SYMBOL MARK OF THIS SCHEMETIC DIAGRAM INCORPORATES SPECIAL FEATURES IMPORTANT FOR PROTECTION FROM X-RADIATION. FILRE AND ELECTRICAL SHOCK HAZARDS, WHEN SERVICING IF IS ESSENTIAL THAT ONLY MANUFATURES SPECFIED PARTS BE USED FOR THE CRITICAL COMPONENTS IN THE ⚠ SYMBOL MARK OF THE SCHEMETIC.

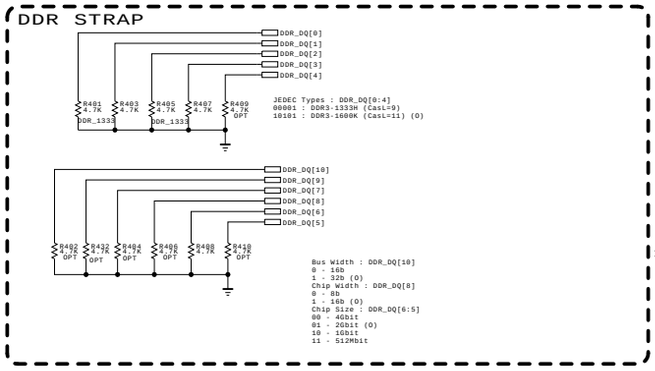
SECRET

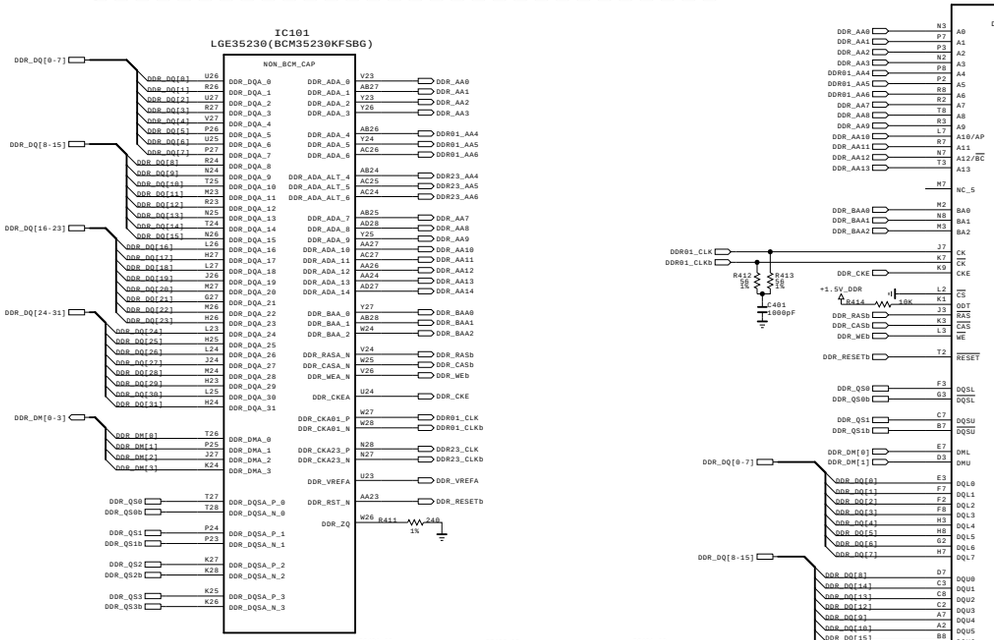
LGElectronics

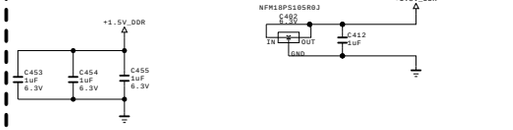
LG ELECTRONICS

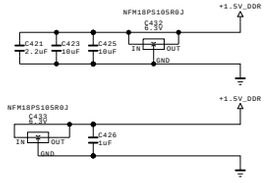
MODEL	BCM35230	DATE	
BLOCK	MAIN AUDIO/VIDEO	SHEET	3 / 50

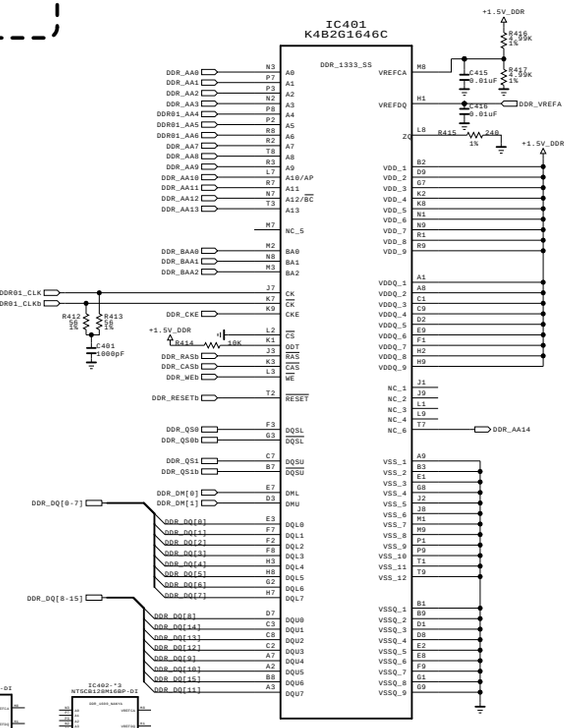
DUAL COMPONENT	
IC401,IC402	1ST : EAN61667501, 2ND : EAN61570701
IC401-*1 IC402-*1	1ST : T-K4B2G1646B_HCK0, 2ND : T-H5TQ2G63BFR-PBC

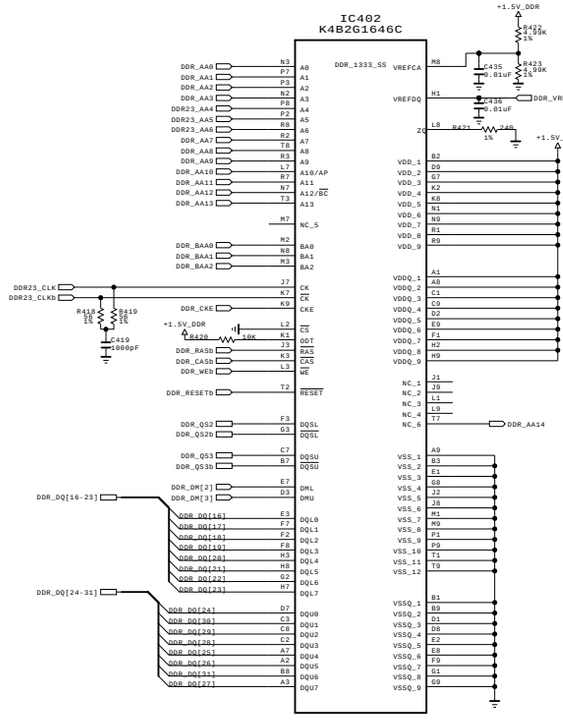


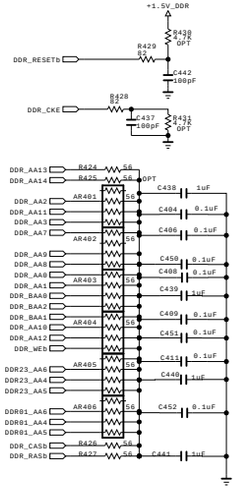


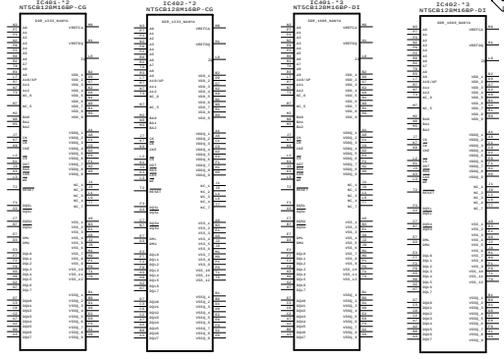












THE ⚠ SYMBOL MARK OF THIS SCHEMETIC DIAGRAM INCORPORATES SPECIAL FEATURES IMPORTANT FOR PROTECTION FROM X-RADIATION. FILRE AND ELECTRICAL SHOCK HAZARDS, WHEN SERVICING IF IS ESSENTIAL THAT ONLY MANUFATURES SPECFIED PARTS BE USED FOR THE CRITICAL COMPONENTS IN THE ⚠ SYMBOL MARK OF THE SCHEMETIC.

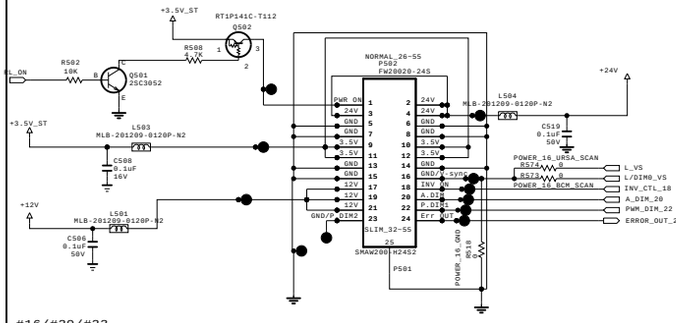
SECRET

LGElectronics

LG ELECTRONICS

MODEL	BCM35230	DATE	
BLOCK	MAIN DDR	SHEET	4 / 50

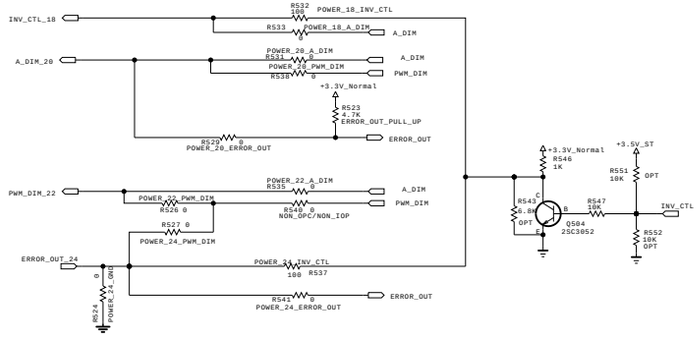
FROM LIPS & POWER B/D



#16/#20/#23
LD - GND OR USE
LE(N.L.D.) - OPEN
LE(L.D.) - USE

DUAL COMPONENT	
Q501,Q504, Q505,Q506	1ST : 0TRIY80001A 2ND : 0TR387500AA
Q502	1ST : 0TRIH80004A, 2ND : EBK61012501, 3RD : 0TR102009AM
Q507	1ST : EBK60752501, 2ND : EBK61011501
IC502,IC503	1ST : EAN61151001, 2ND : EAN60670101

OS Module OPT



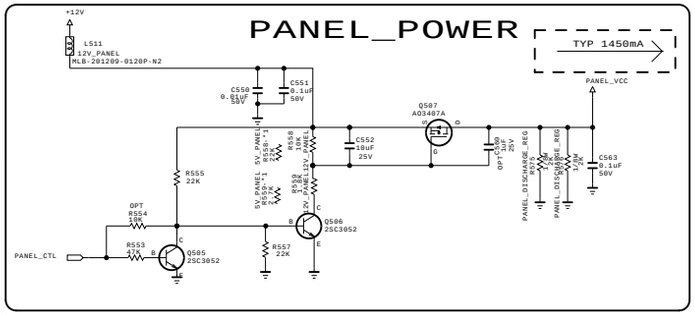
<OS MODULE PIN MAP>

PIN No	LGD	CMO(09)	AUO	SHARP
18	INV_ON	A-DIM	INV_ON	INV_ON
20	V4:VBR-A V5:NC	NC	Err_out	Err_out
22	PWM_DIM	PWM_DIM	A-DIM	PWM_DIM
24	Err_out LED:GND	INV_ON	PWM_DIM	GND

CHECK PWR/MODULE PIN MAP

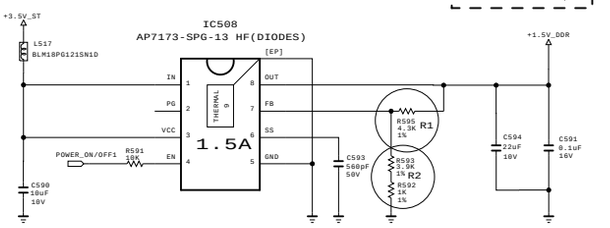
PANEL_POWER

TYP 1450mA



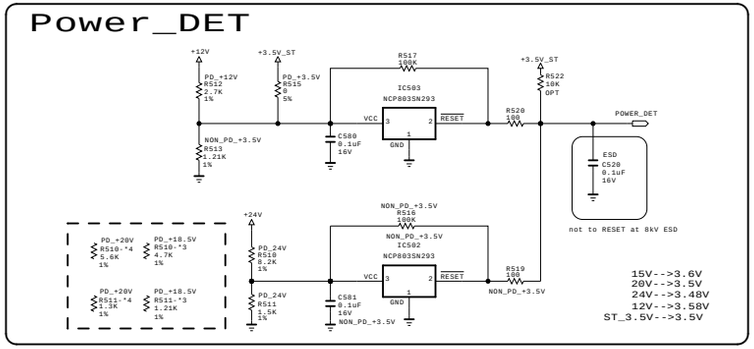
+1.5V_DDR

Max 800mA



Vout=0.8*(1+R1/R2)

Power_DET

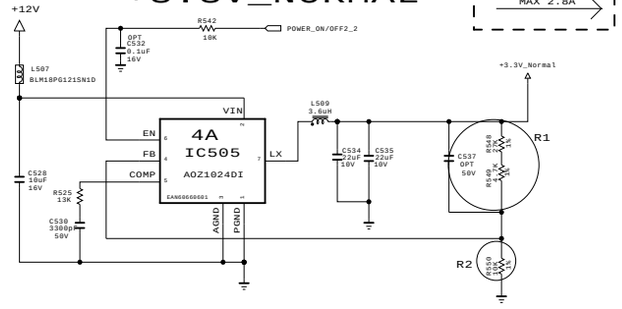


15V-->3.6V
20V-->3.5V
24V-->3.48V
12V-->3.58V
ST_3.5V-->3.5V

+3.3V_NORMAL

Vout=0.8*(1+R1/R2)

MAX 2.8A

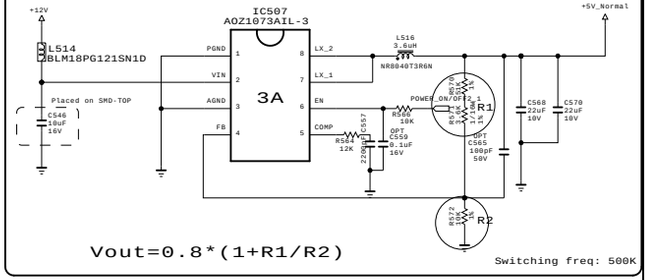


Vout=0.8*(1+R1/R2)

Switching freq: 500K

+5V_Normal

MAX 1A

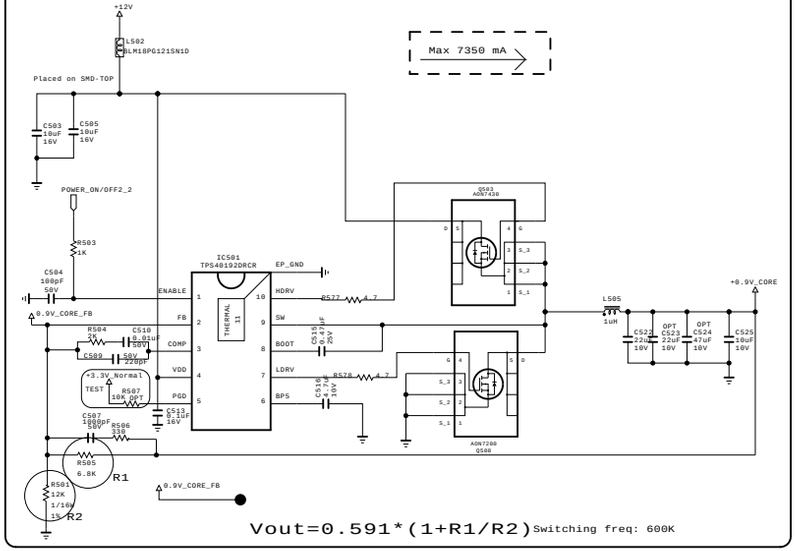


Vout=0.8*(1+R1/R2)

Switching freq: 500K

+0.9V_CORE_BCM35230

Max 7350 mA

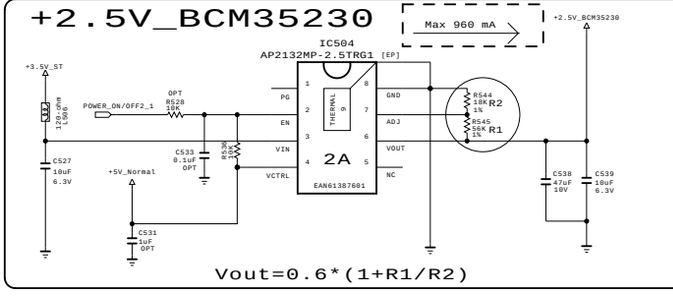


Vout=0.591*(1+R1/R2)

Switching freq: 600K

+2.5V_BCM35230

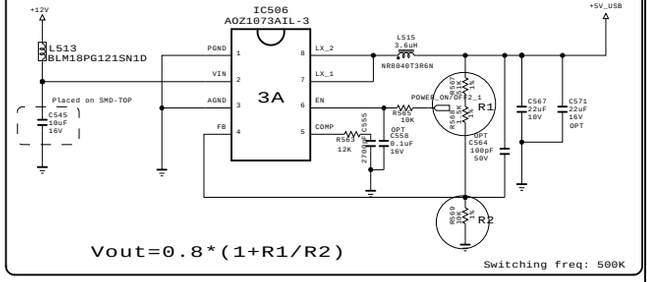
Max 960 mA



Vout=0.6*(1+R1/R2)

+5V_USB+WIFI

MAX 1.9A



Vout=0.8*(1+R1/R2)

Switching freq: 500K

THE ⚠ SYMBOL MARK OF THIS SCHEMETIC DIAGRAM INCORPORATES SPECIAL FEATURES IMPORTANT FOR PROTECTION FROM X-RADIATION. FILRE AND ELECTRICAL SHOCK HAZARDS, WHEN SERVICING IF IS ESSENTIAL THAT ONLY MANUFATURES SPECFIED PARTS BE USED FOR THE CRITICAL COMPONENTS IN THE ⚠ SYMBOL MARK OF THE SCHEMETIC.

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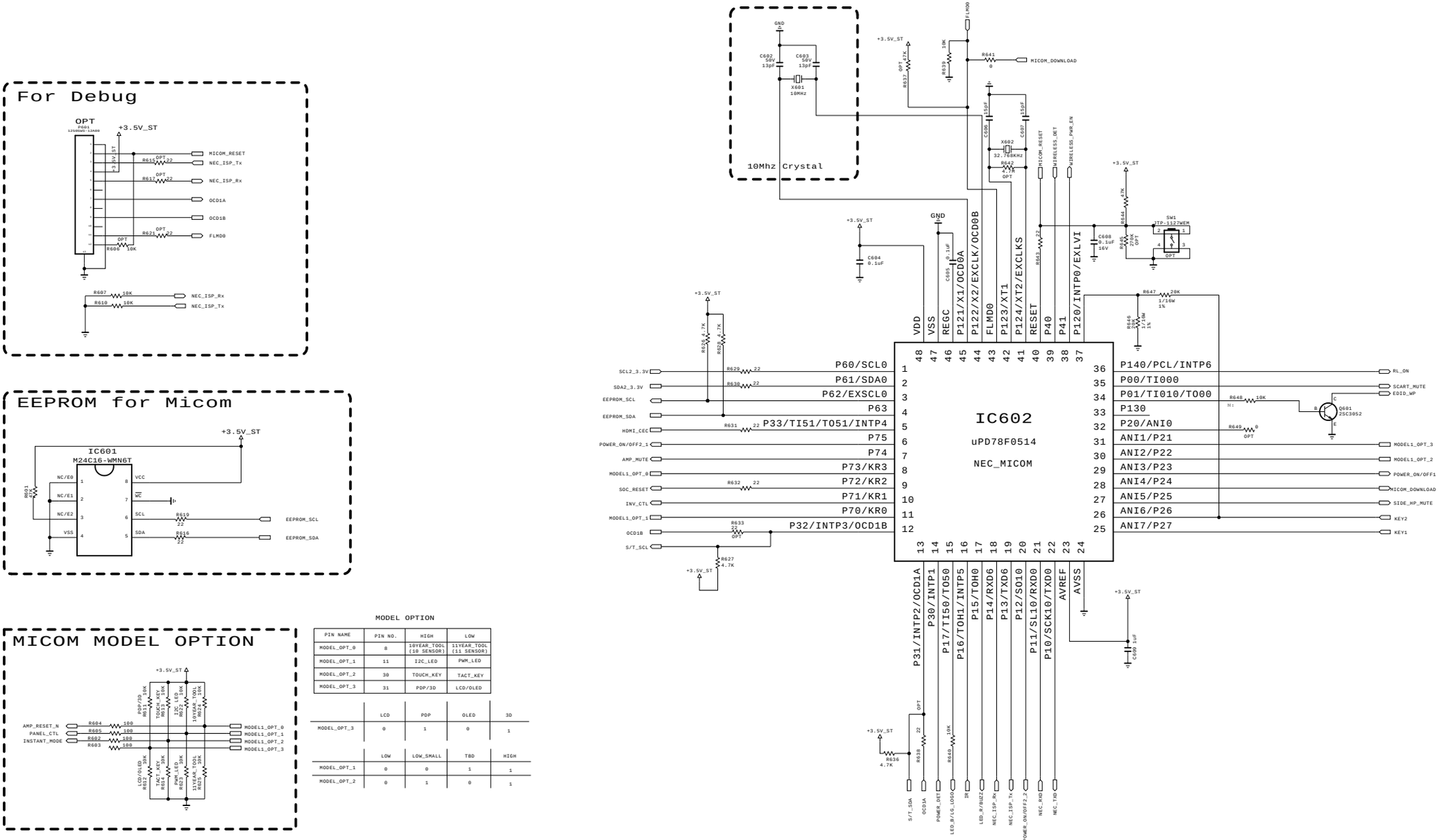
LGElectronics

LG ELECTRONICS

MODEL	BCM35230	DATE	
BLOCK	POWER	SHEET	5 / 58

NEC MICOM



MODEL OPTION

PIN NAME	PIN NO.	HIGH	LOW
MODEL_OPT_0	8	10YEAR_TOOL (10 SENSOR)	11YEAR_TOOL (11 SENSOR)
MODEL_OPT_1	11	I2C_LED	PWM_LED
MODEL_OPT_2	30	TOUCH_KEY	TACT_KEY
MODEL_OPT_3	31	PDP/3D	LCD/OLED

	LCD	PDP	OLED	3D
MODEL_OPT_3	0	1	0	1

	LOW	LOW_SMALL	TBD	HIGH
MODEL_OPT_1	0	0	1	1
MODEL_OPT_2	0	1	0	1

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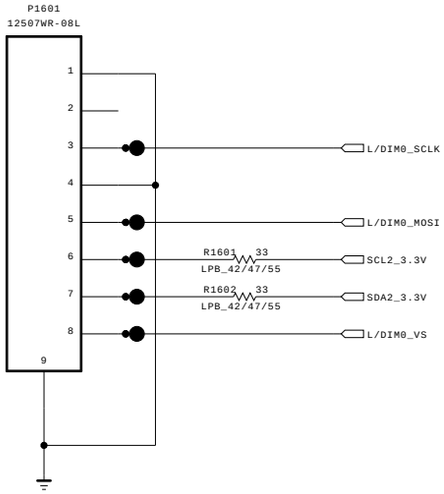
LG ELECTRONICS

MODEL	BCM35230	DATE	
BLOCK	MICOM	SHEET	6 / 50

LGE Internal Use Only

[Local Dimming Block]



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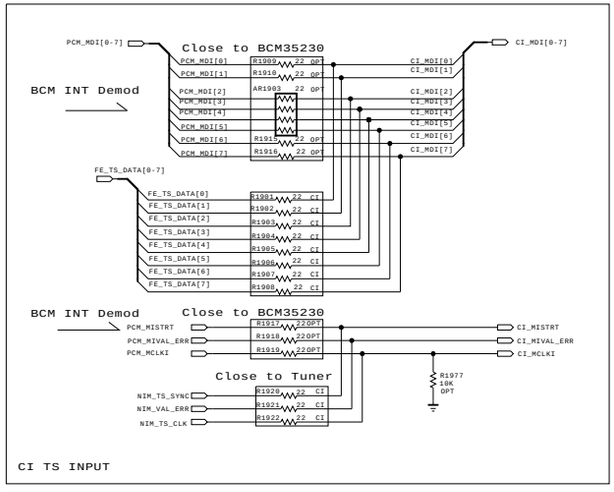
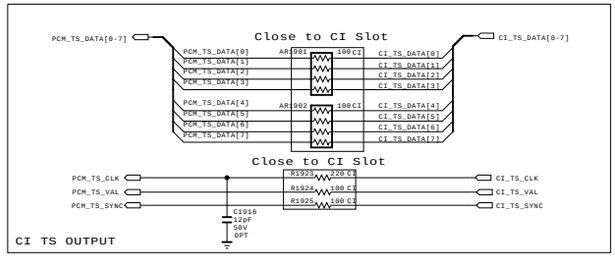
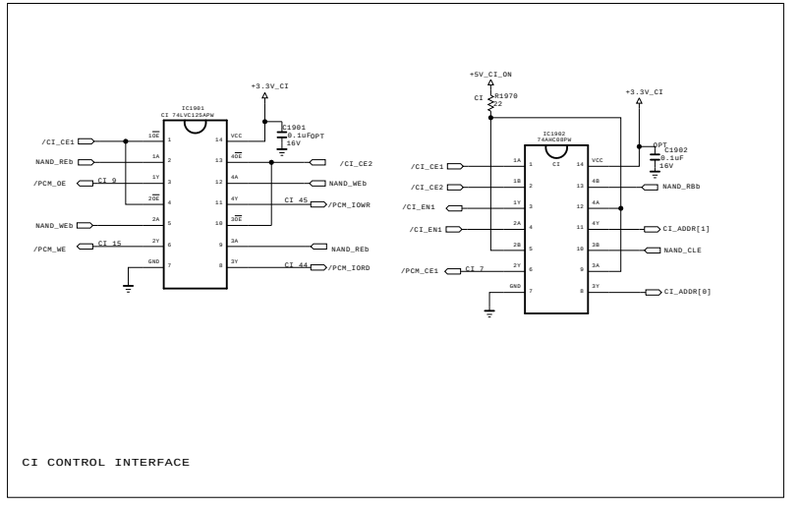
LG ELECTRONICS

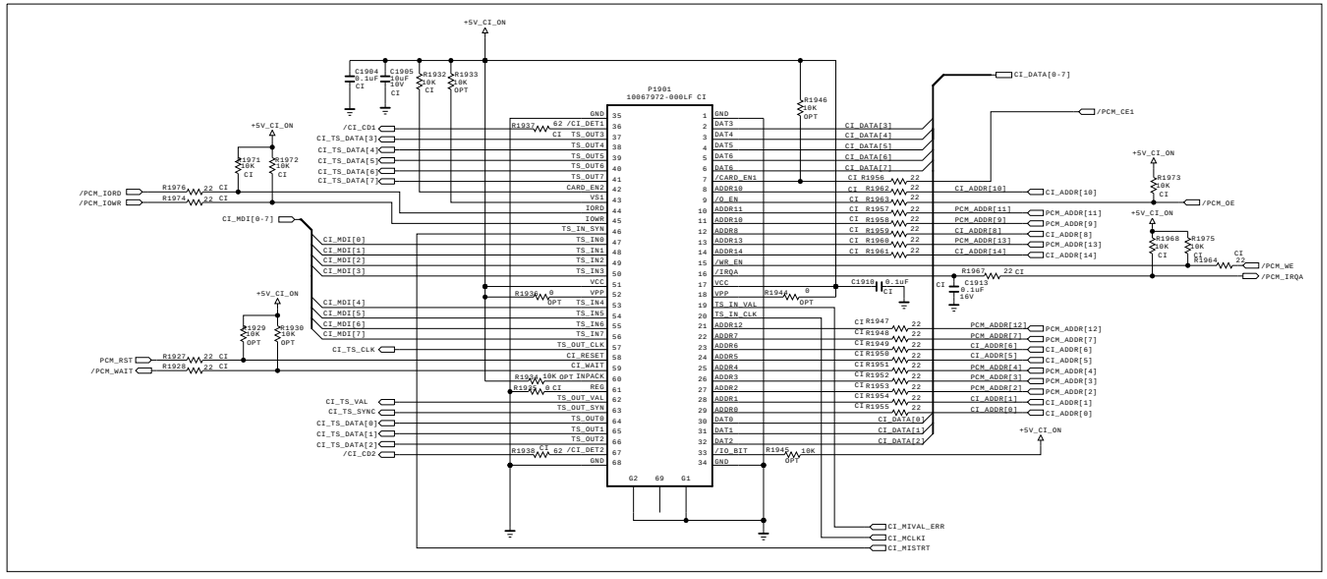
MODEL	BCM35230	DATE	
BLOCK	L_DIMMING	SHEET	16 / 50

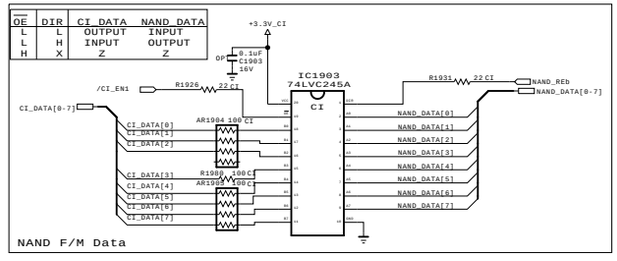
DUAL COMPONENT	
Q1901	1ST : 0TRIY80001A 2ND : 0TR387500AA
Q1902	1ST : EBK60752501, 2ND : EBK61011501
IC1904	1ST : 0ISTLPH062A, 2ND : EAN40055001

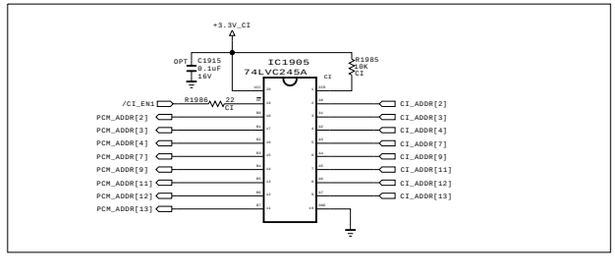


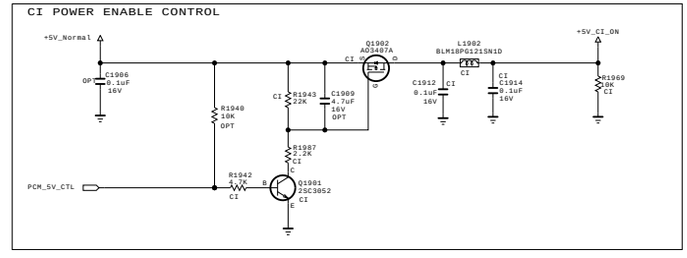


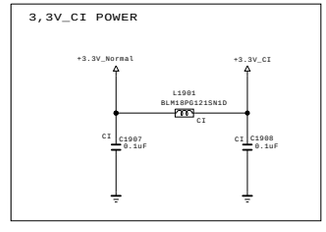


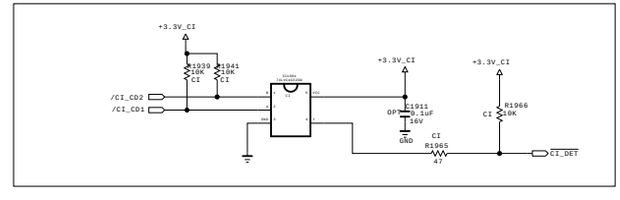












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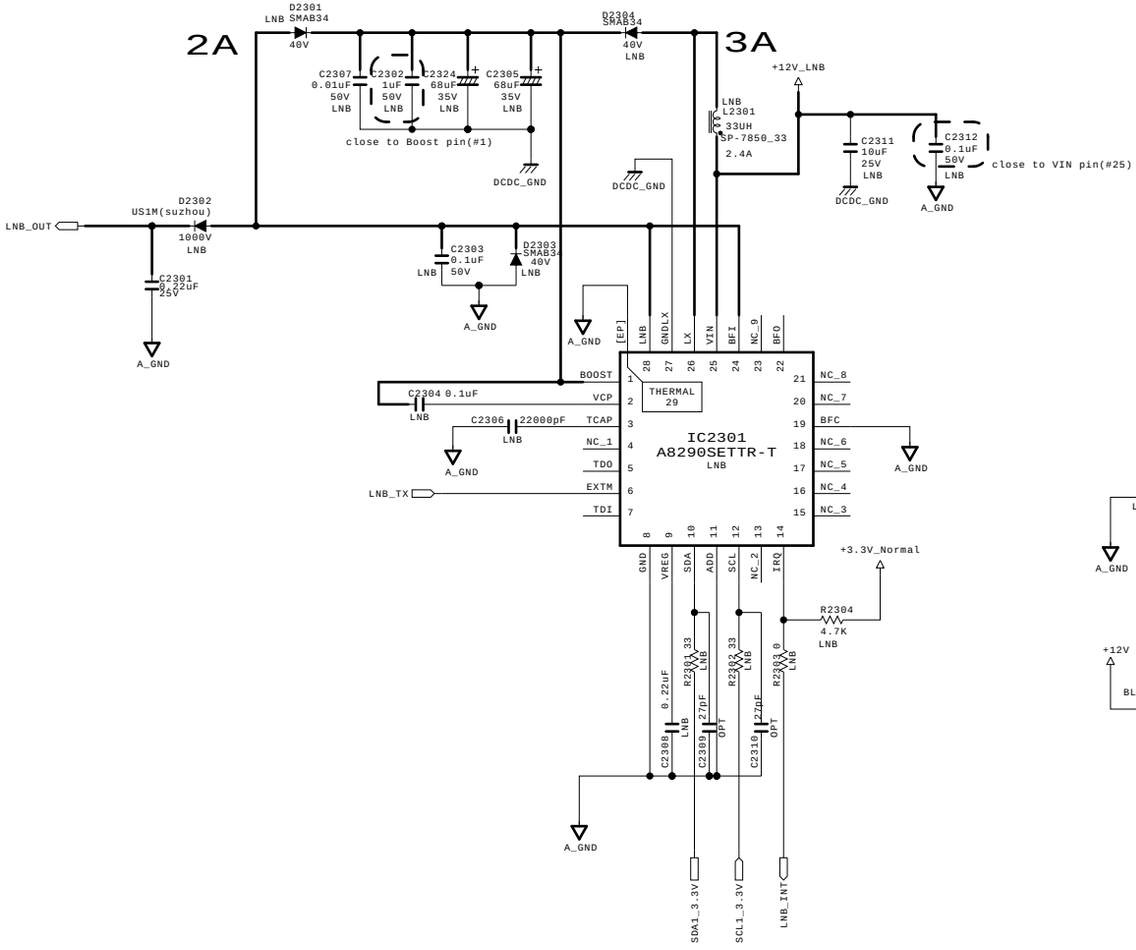
LGElectronics

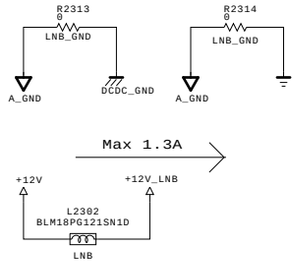
LG ELECTRONICS

MODEL	BCM35230	DATE	2010.11.11
BLOCK	CI	SHEET	19 / 58

DVB-S2 LNB Part Allegro

(Option:LNB)





DCDC_GND and A_GND are connected
DCDC_GND and A_GND are connected in pin#27
PCB_GND and A_GND are connected

Input trace widths should be sized to conduct at least 3A
Ouput trace widths should be sized to conduct at least 2A

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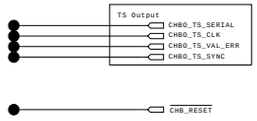
LG ELECTRONICS

MODEL	BCM35230	DATE	2010.11.02
BLOCK	LNB	SHEET	23 / 57

NON CHB



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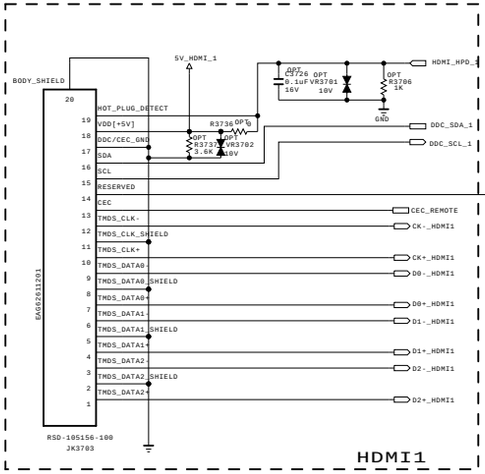
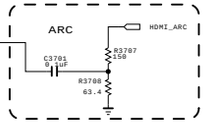
LGElectronics

LG ELECTRONICS

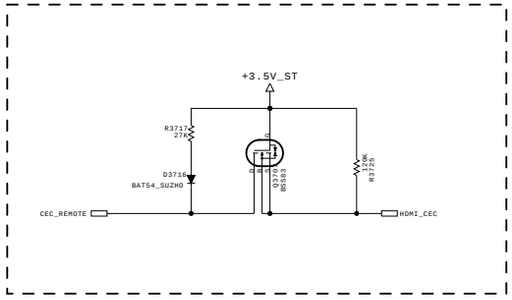
MODEL	BCM35230	DATE	
BLOCK	NON CHB	SHEET	28 / 50

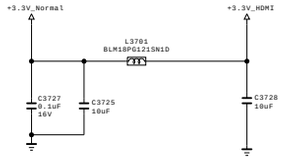
DUAL COMPONENT	
D3716	1ST : T-BAT54_SUZHO, 2ND : 0DSON00138A
IC3702	1ST : EAN60991801, 2ND : T-AZ1117BH_1.8, 3RD : EAN54428201

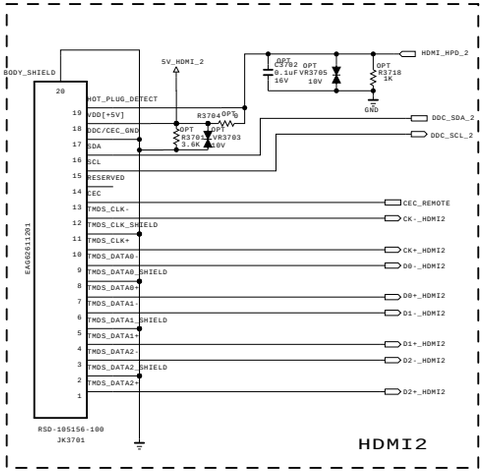


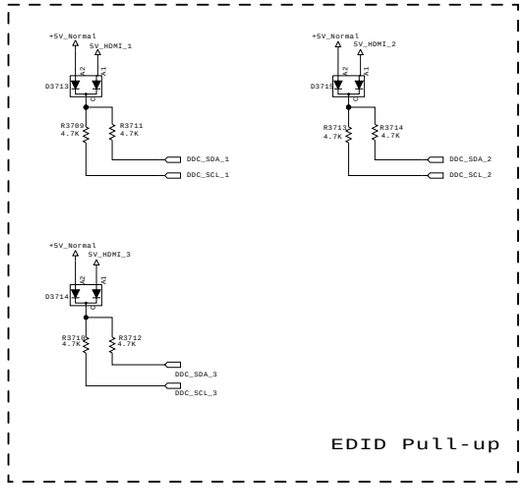


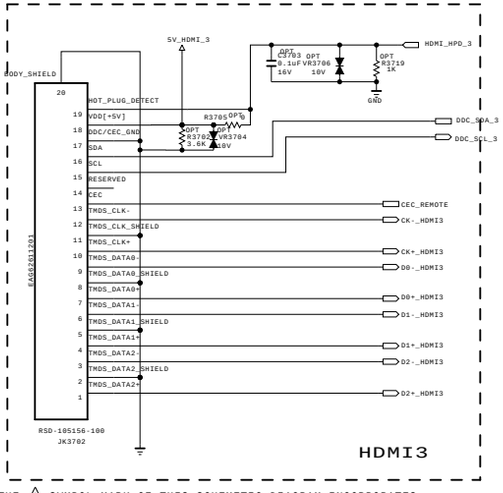
* HDMI_CEC

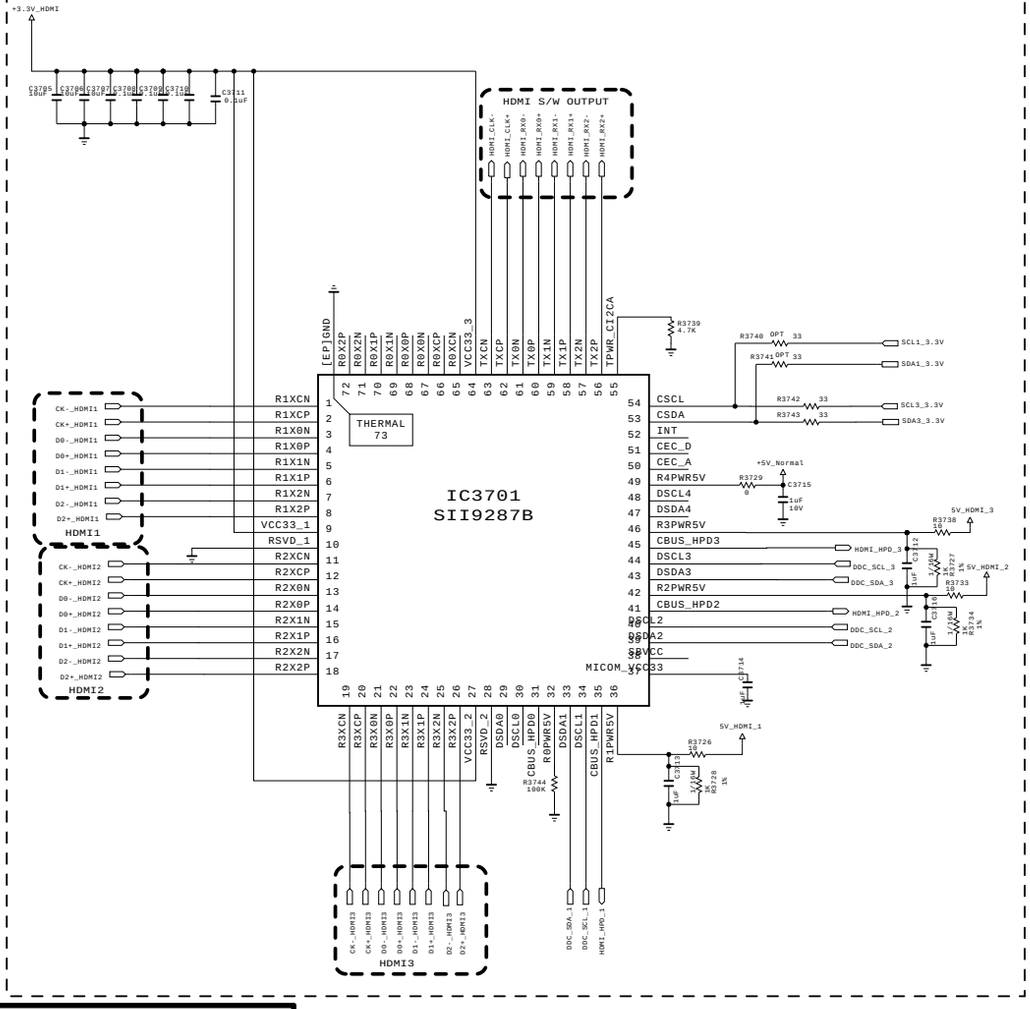












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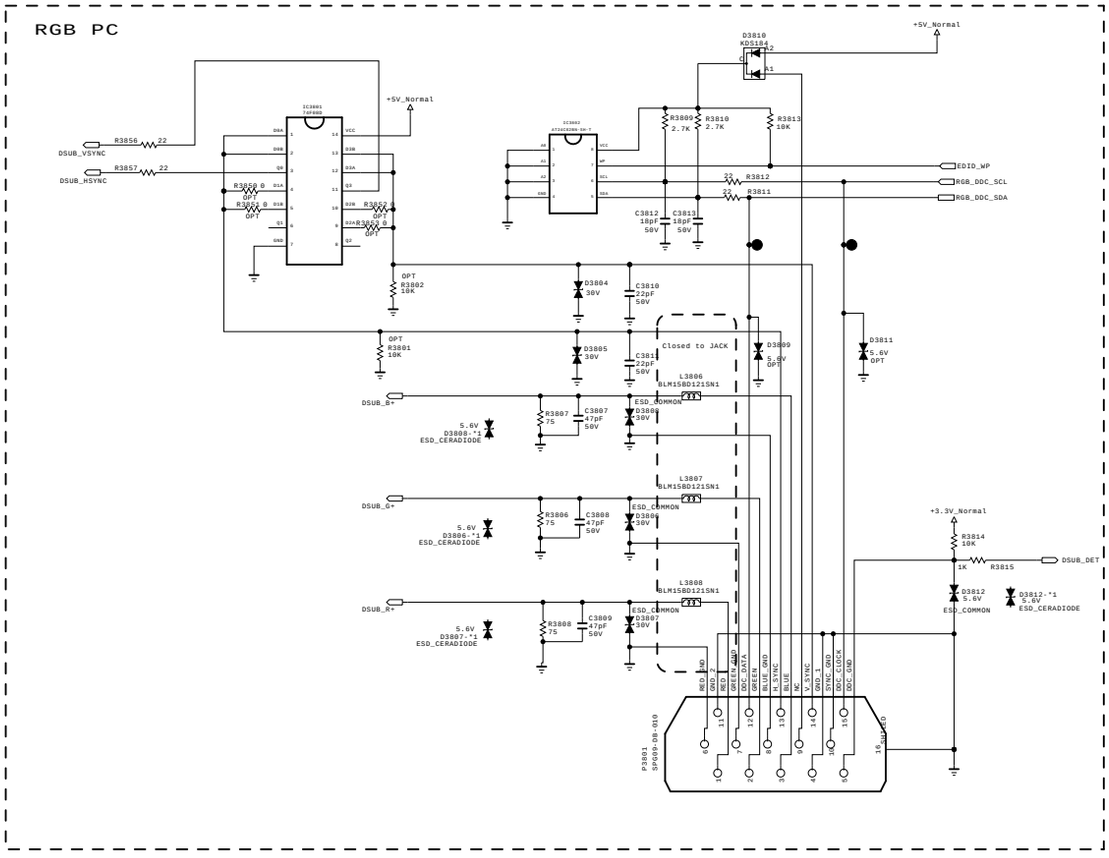
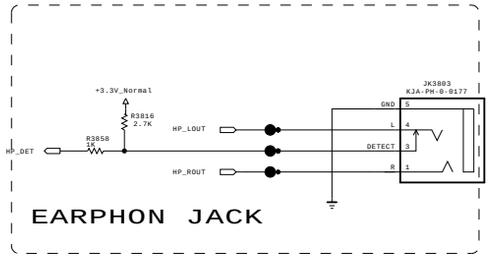
SECRET
LGElectronics

LG ELECTRONICS

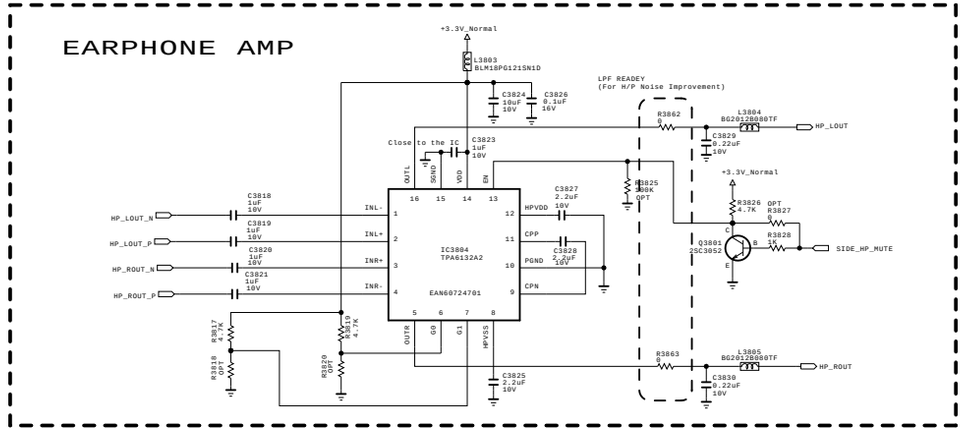
MODEL	BCM35230	DATE	
BLOCK	LV7 HDMI	SHEET	37 / 50

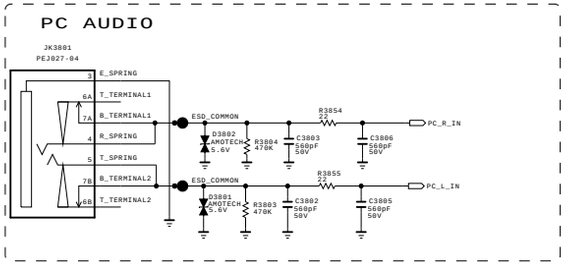
RGB/ PC AUDIO/ SPDIF/ EARPHONE/ RS232C

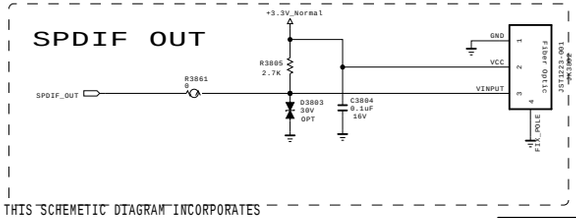


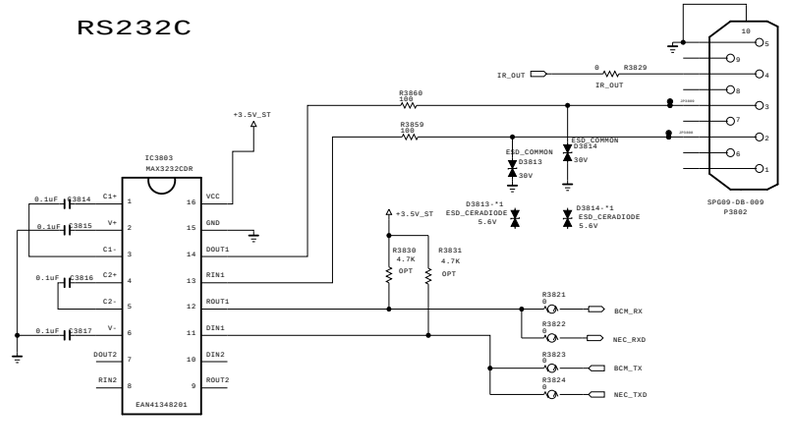


DUAL COMPONENT	
D3804,D3805,D3806 D3807,D3808,D3813 D3814	1ST : EAH39491601, 2ND : EAH33945901
D3810	1ST : 0DD184009AA, 2ND : 0DSIH00028A
Q3801	1ST : 0TRIY80001A, 2ND : 0TR387500AA









HIGH : SELECT X1, Y1, SELECT MAIN TX/RX
LOW : SELECT X0, Y0, SELECT MICOM TX/RX

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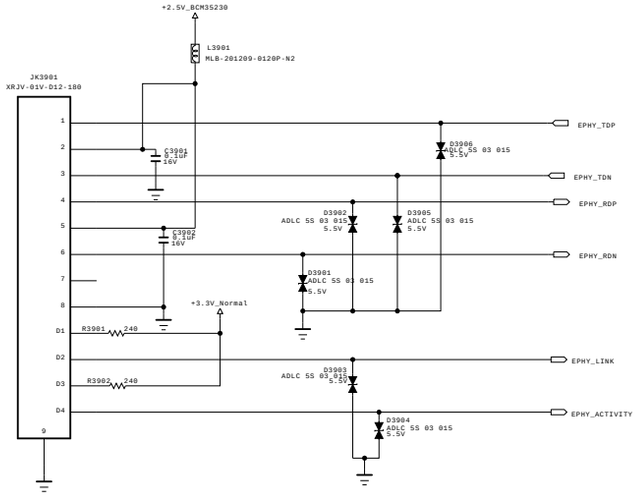
SECRET
LGElectronics

LG ELECTRONICS

MODEL	BCM35230	DATE	
BLOCK	LV7 COMM JACK	SHEET	38 / 50

LGE Internal Use Only

Ethernet Block



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SECRET
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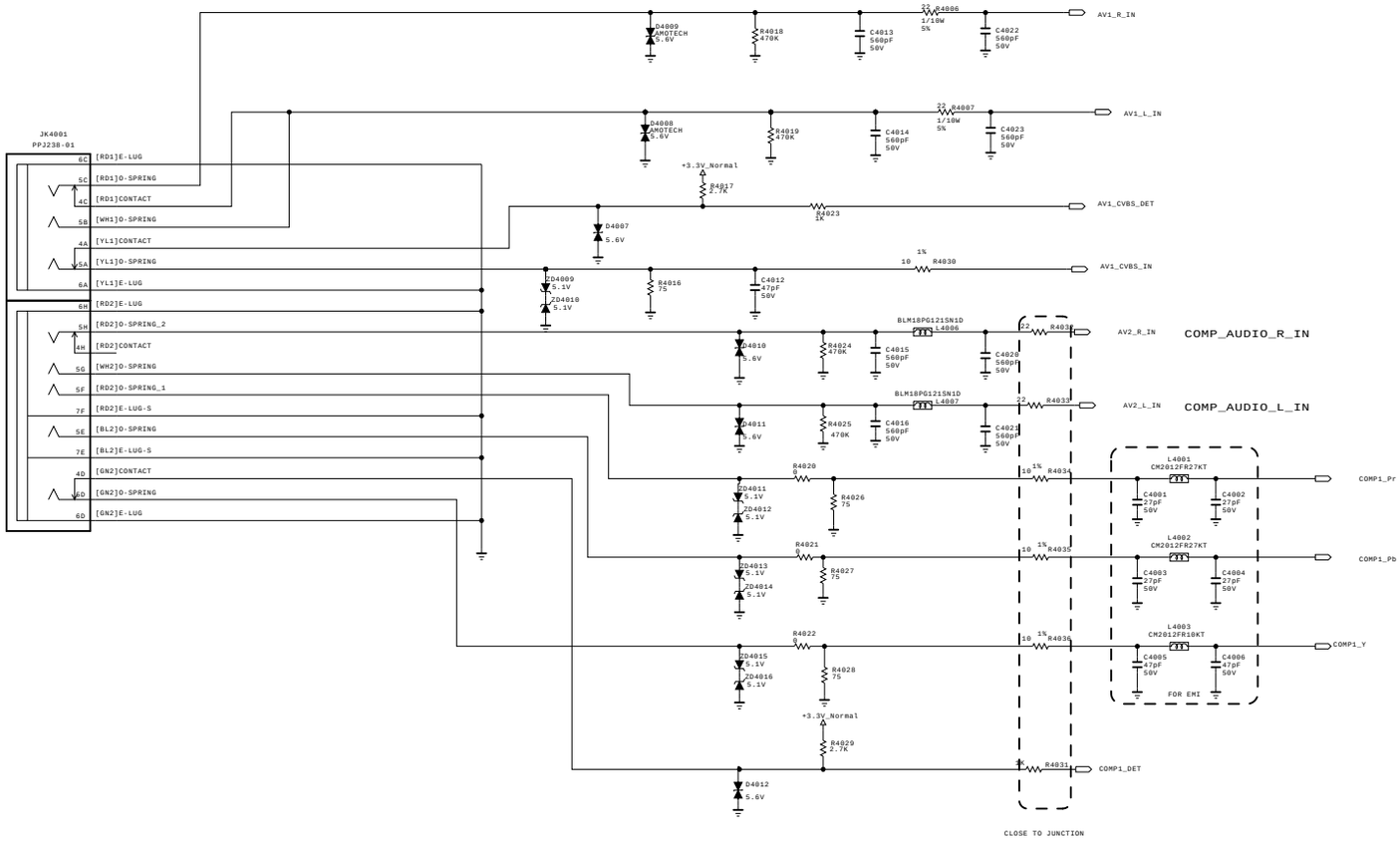
LG ELECTRONICS

MODEL	BCM35230	DATE	
BLOCK	LV7 ETHERNET	SHEET	39 / 50

COMP/AV JACK PACK



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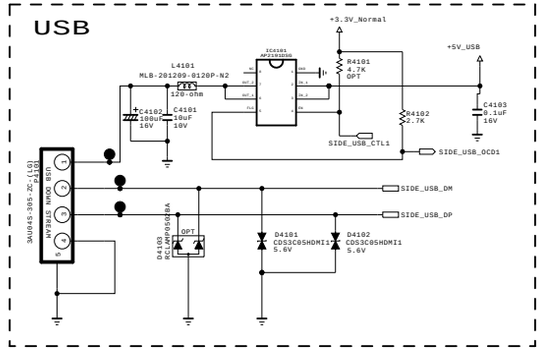
SECRET
LGElectronics

LG ELECTRONICS

MODEL	BCM35230	DATE	
BLOCK	LV7 EU COMP/AV	SHEET	40 / 50

DUAL COMPONENT	
D4101,D4102	1ST : EAH42720601 2ND : EAH60994401



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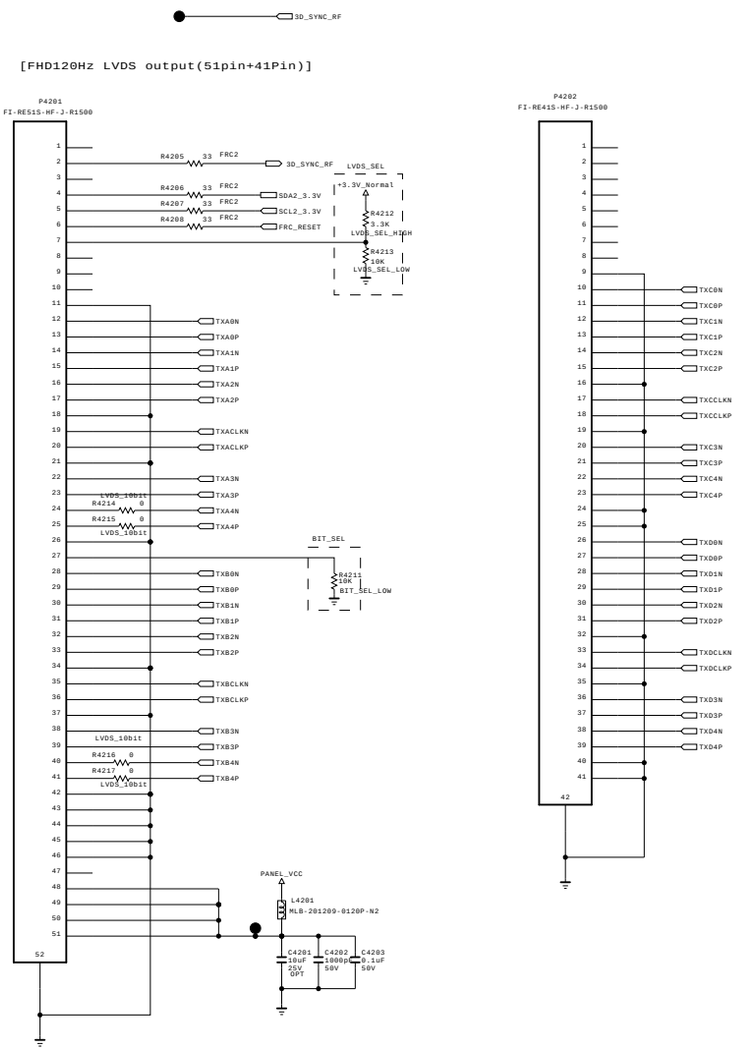
SECRET
LGElectronics

LG ELECTRONICS

MODEL	BCM35230	DATE	
BLOCK	LV7 EU USB	SHEET	41 / 50



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SECRET
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LG ELECTRONICS

MODEL	BCM35230	DATE	
BLOCK	LV7 EU LVDS	SHEET	42 / 50

H/NIM & F/NIM & T/C/S2 Combo Tuner

Option Table		
H/NIM (EU)	F/NIM_T/C	DVB-T/C/S2 (Eu,Alsa)
Non_S	Non_S	S
H/NIM	F/NIM	H/NIM
SCART	SCART	SCART
BOOSTER	BOOSTER EU_BR_F/NIM RF_SW_CTL EU_F/NIM TC_F/NIM	

* DVB-T/C/S2 combo Tuner: DVB-T/C is H/NIM, and DVB-S2 is F/NIM

Non_S: not use DVB-T/C/S2 combo Tuner(use H/NIM and F/NIM)
S: use DVB-T/C/S2 combo Tuner
H/NIM: use H/NIM(H/NIM, DVB-T/C/S2 combo Tuner)
F/NIM: use F/NIM(EU_T/C, EU_DVB-T2, China)
SCART: use Scart Jack
CN : use China F/NIM
BOOSTER: use BOOSTER_CTL
RF_SW_CTL: use RF_SWITCH_CTL
TC_F/NIM: use EU_DVB-T/C F/NIM
T2_CN_F/NIM_BR: use EU_DVB-T2, China F/NIM, BRZIL F/NIM
EU_F/NIM: use EU_F/NIM
EU_BR_F/NIM: use EU_F/NIM and Brazil F/NIM

DUAL COMPONENT	
IC4401	1ST : T-TJ3940S_XX, 2ND : T-AP2114H_2.5TRG1

TU4401
TDFR-G136D

TU4402
TDFQ-G001D

HORIZONTAL_T		HORIZONTAL_S
1	NC_1	1 NC_1
2	BST_CNTL	2 NC_2
3	+B1[5V]	3 NC_3
4	NC_2[RF_AGC]	4 S2_TU[3.3V]
5	NC_3	5 NC_4
6	SCLT	6 TU_SCL
7	SDAT	7 TU_SDA
8	NC_4	8 T_1.8V
9	SIF	9 T_SIF
10	NC_5	10 NC_5
11	VIDEO	11 T_CVBS
12	GND	12 GND_1
13	+B2[1.2V]	13 TD_1.2V
14	+B3[3.3V]	14 T_3.3
15	RESET	15 T_TU_RESET
16	+B4[2.5V]	16 NC_6
17	SCL	17 TD_SCL
18	SDA	18 TD_SDA
19	ERR	19 T/C/S2_ERROR
20	SYNC	20 T/C/S2_SYNC
21	VALID	21 T/C/S2_VALID
22	MCL	22 T/C/S2_MCL
23	D0	23 T/C/S2_D0
24	D1	24 T/C/S2_D1
25	D2	25 T/C/S2_D2
26	D3	26 T/C/S2_D3
27	D4	27 T/C/S2_D4
28	D5	28 T/C/S2_D5
29	D6	29 T/C/S2_D6
30	D7	30 T/C/S2_D7
31		31 S2_1.25V
		32 S2_RESET
		33 S2_3.3V
		34 S2_F22
		35 S2_SCL
		36 S2_SDA
		37 GND_2
		38 S2_LNB
SHIELD		39 SHIELD

close to TUNER

ERROR & VALID PIN

<EU, China>

Tuner to CI Slot

Max 1.5A

Vout=0.6*(1+R1/R2)

Max 217mA

OPTION:SCART

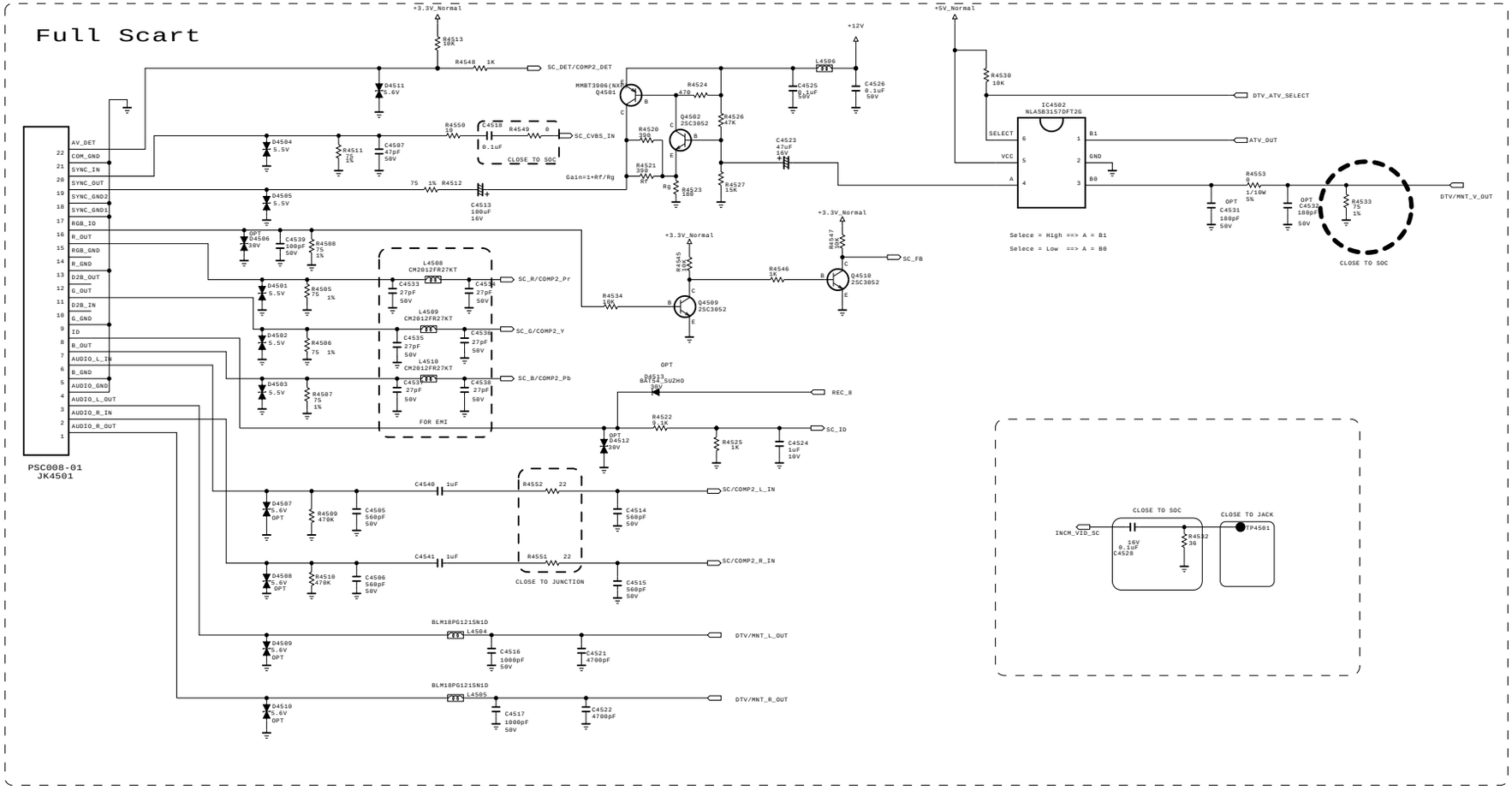
THE ⚠ SYMBOL MARK OF THIS SCHEMETIC DIAGRAM INCORPORATES SPECIAL FEATURES IMPORTANT FOR PROTECTION FROM X-RADIATION. FILRE AND ELECTRICAL SHOCK HAZARDS, WHEN SERVICING IF IS ESSENTIAL THAT ONLY MANUFATURES SPECFIED PARTS BE USED FOR THE CRITICAL COMPONENTS IN THE ⚠ SYMBOL MARK OF THE SCHEMETIC.

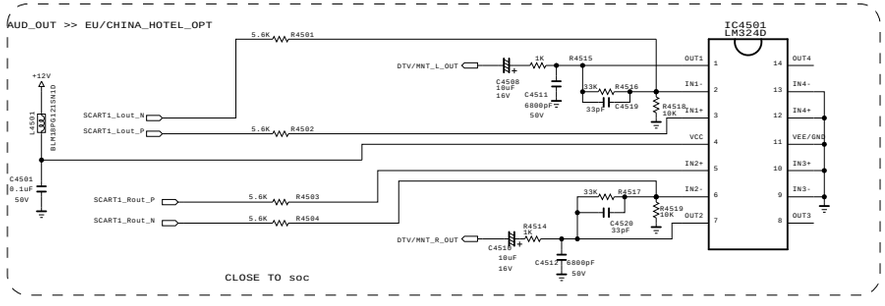
SECRET
LGElectronics

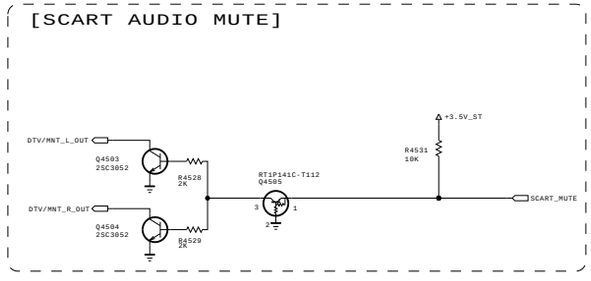
LG ELECTRONICS

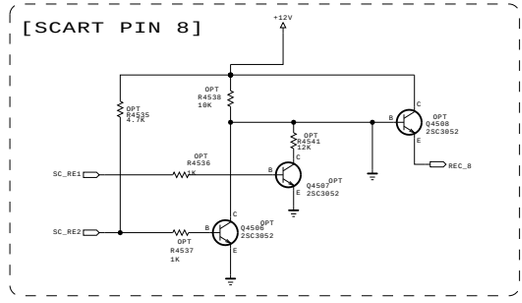
MODEL	BCM35230	DATE	
BLOCK	LV7 EU TUNER	SHEET	44 / 50

DUAL COMPONENT	
Q4502,Q4503 Q4504,Q4506 Q4507,Q4508	1ST : 0TRIY80001A 2ND : 0TR387500AA
Q4501	1ST : EBK61012701, 2ND : EBK58172301
Q4505	1ST : 0TRIH80004A, 2ND : EBK61012501, 3RD : 0TR102009AM
D4513	1ST : T-BAT54_SUZHO, 2ND : 0DSON00138A









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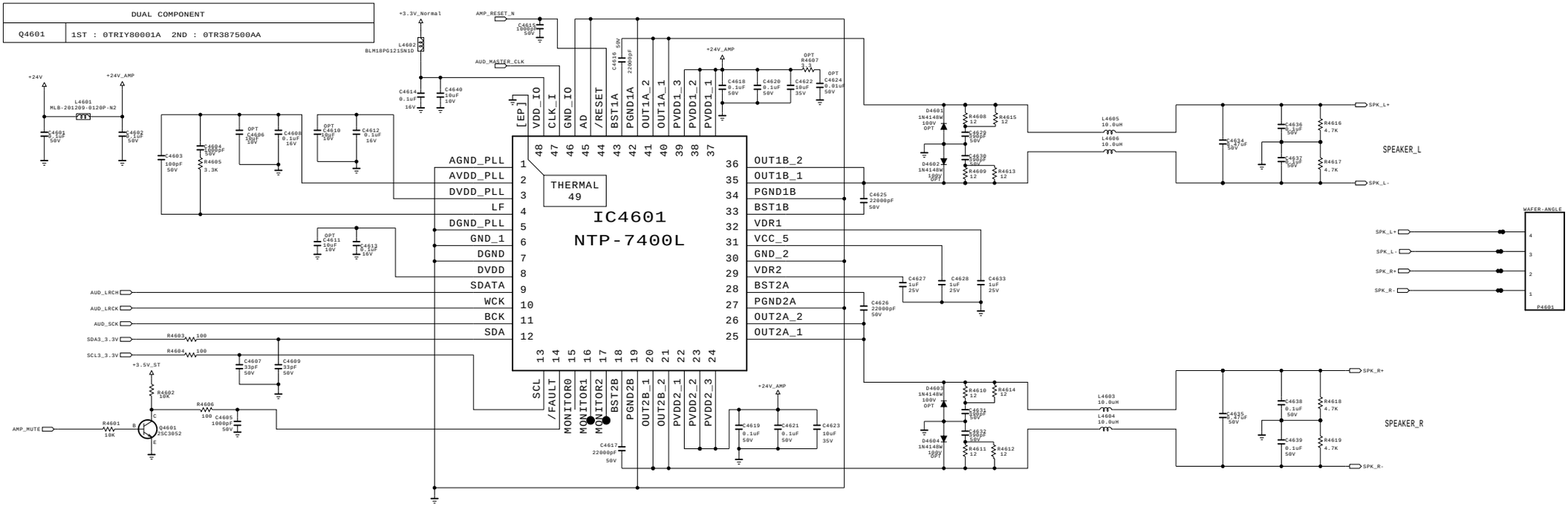
SECRET
LGElectronics

LG ELECTRONICS

MODEL	BCM35230	DATE	
BLOCK	LV7 EU SCART	SHEET	45 / 50

DUAL COMPONENT	
Q4601	1ST : 0TRIY80001A 2ND : 0TR387500AA



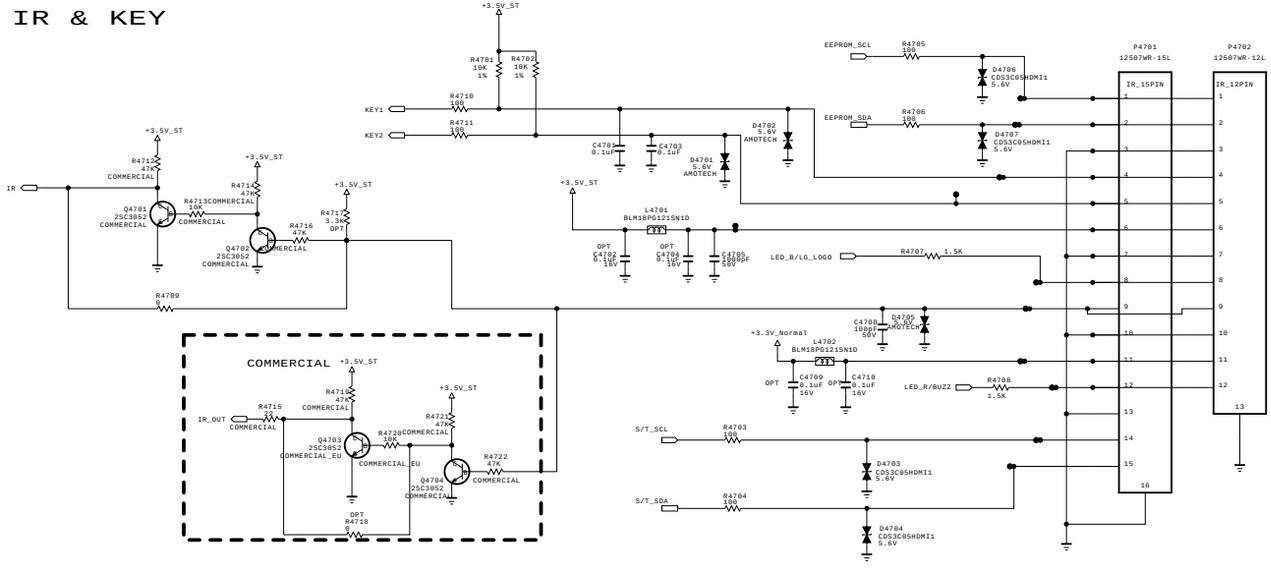
SECRET
LGElectronics

LG ELECTRONICS

MODEL	BCM35230	DATE	
BLOCK	LV7 EU AMP	SHEET	46 / 50

DUAL COMPONENT	
D4703,D4704 D4705,D4706	1ST : EAH42720601, 2ND : EAH60994401

IR & KEY



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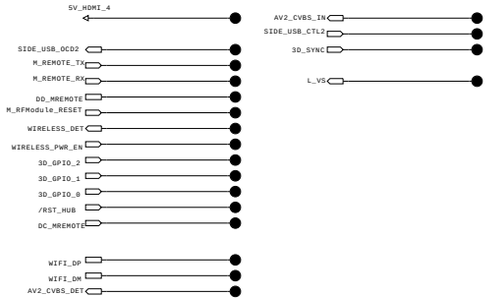
SECRET
LGElectronics

LG ELECTRONICS

MODEL	BCM35230	DATE	
BLOCK	LV7 EU IR	SHEET	47 / 50



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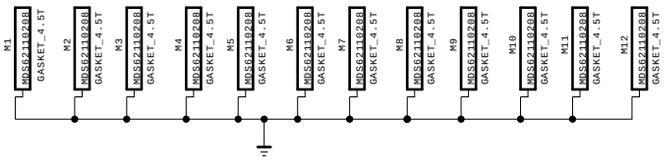
SECRET
LGElectronics

LG ELECTRONICS

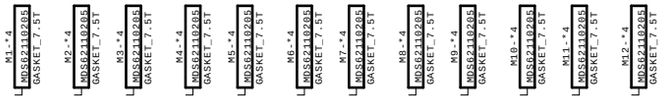
MODEL	BCM35230	DATE	
BLOCK	LV7 EU	SHEET	48 / 50

SMD GASKET

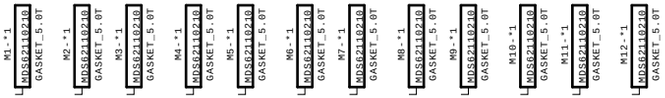
SMD GASKET 4.5T



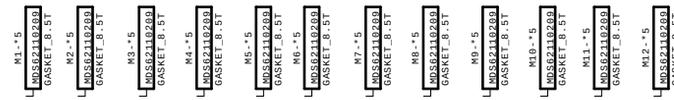
SMD GASKET 7.5T



SMD GASKET 5.0T

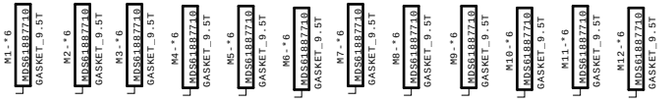


SMD GASKET 8.5T

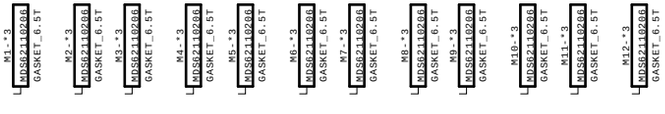


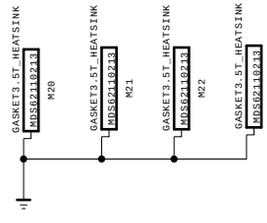
SMD GASKET 5.5T

SMD GASKET 9.5T



SMD GASKET 6.5T





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SECRET
LGElectronics

LG ELECTRONICS

MODEL	BCM35230	DATE	2010. 09. 18
BLOCK	SMD GASKET	SHEET	56 / 56


LG Electronics Inc.

Korea Service-0802-Academy Group

Electronic Product Standard Repair Process

LCD TV

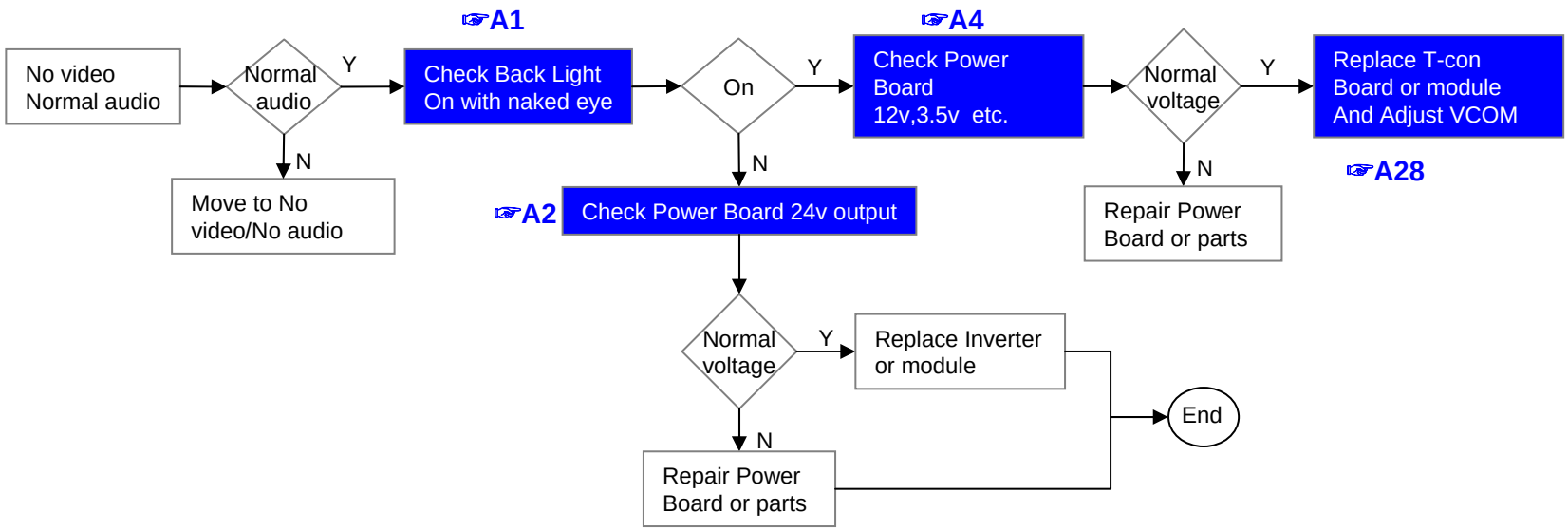
Contents of LCD TV Standard Repair Process

First of all, Check whether there is SVC Bulletin in GCSC System for these model.

Standard Repair Process

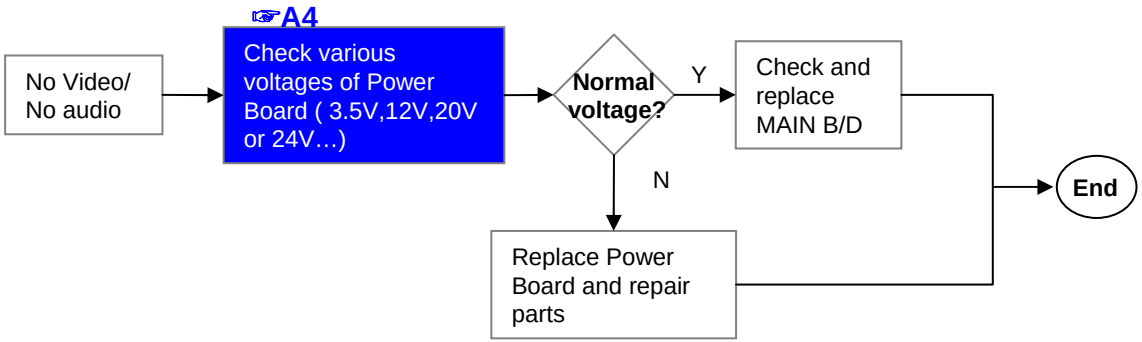
LCD TV	Error symptom	A. Video error	Established date	2010. 12 .14	
		No video/ Normal audio	Revised date		1/14

First of all, Check whether all of cables between board is inserted properly or not.
(Main B/D↔ Power B/D, LVDS Cable,Speaker Cable,IR B/D Cable,,,)

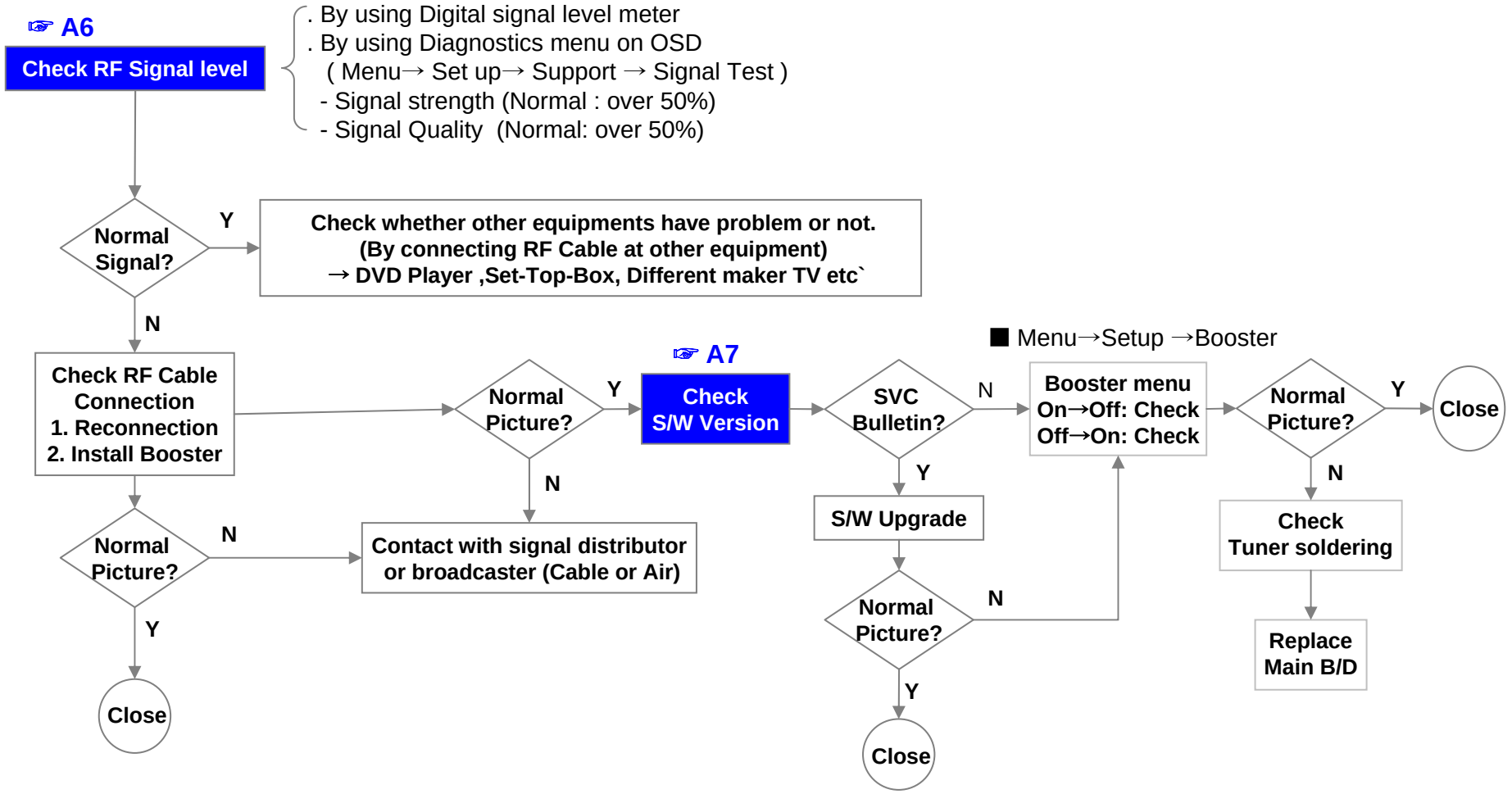


※Precaution ☞A7 & A3

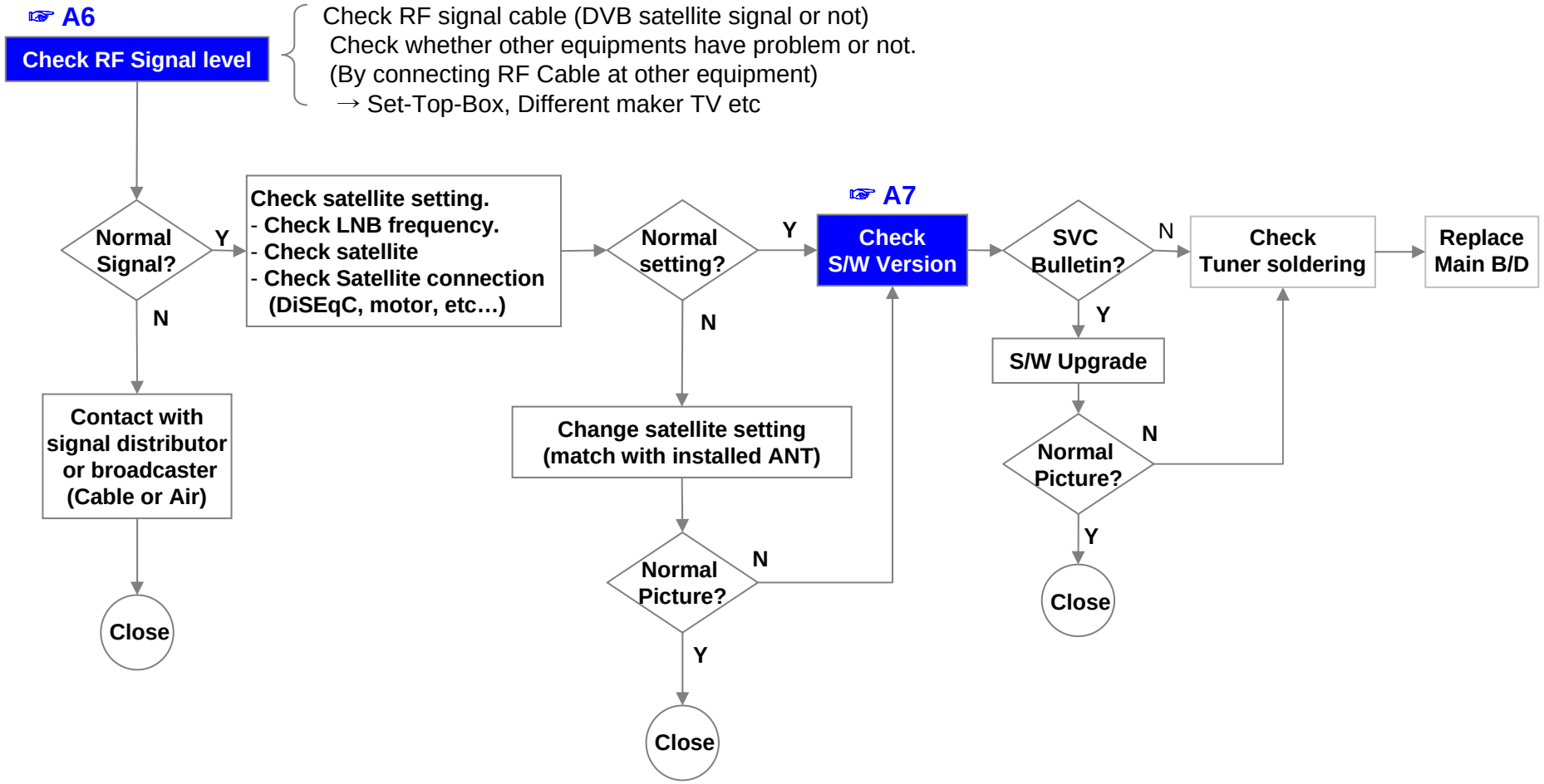
LCD TV	Error symptom	A. Video error	Established date	2010. 12 .14	
		No video/ No audio	Revised date		2/14



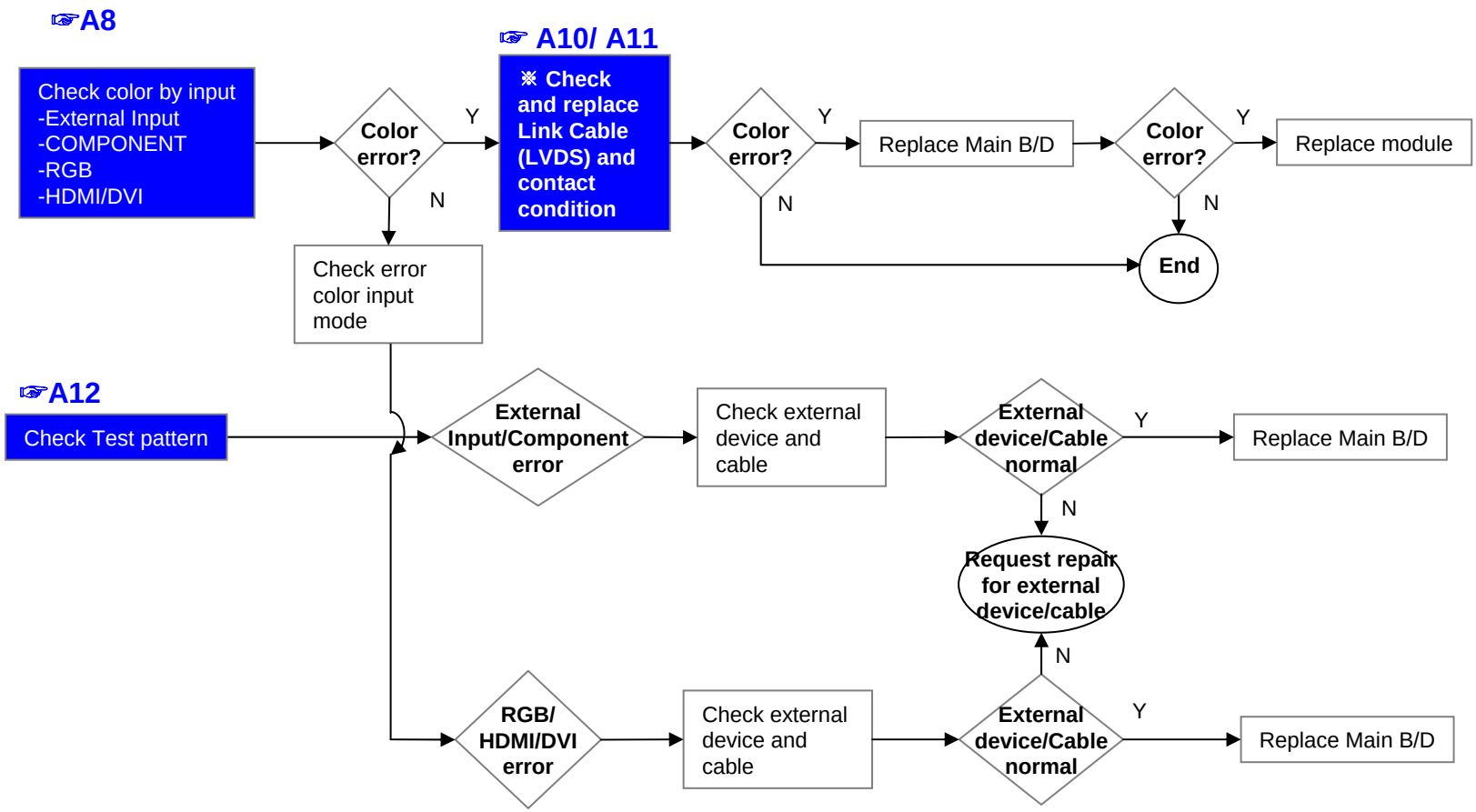
LCD TV	Error symptom	A. Picture Problem	Established date	2010. 12 .14	
		Picture broken/ Freezing	Revised date		3/14



LCD TV	Error symptom	A. Picture Problem (DVB-S/S2)	Established date	2011. 01 .24	
		Tuning fail, Picture broken/ Freezing	Revised date		4/14

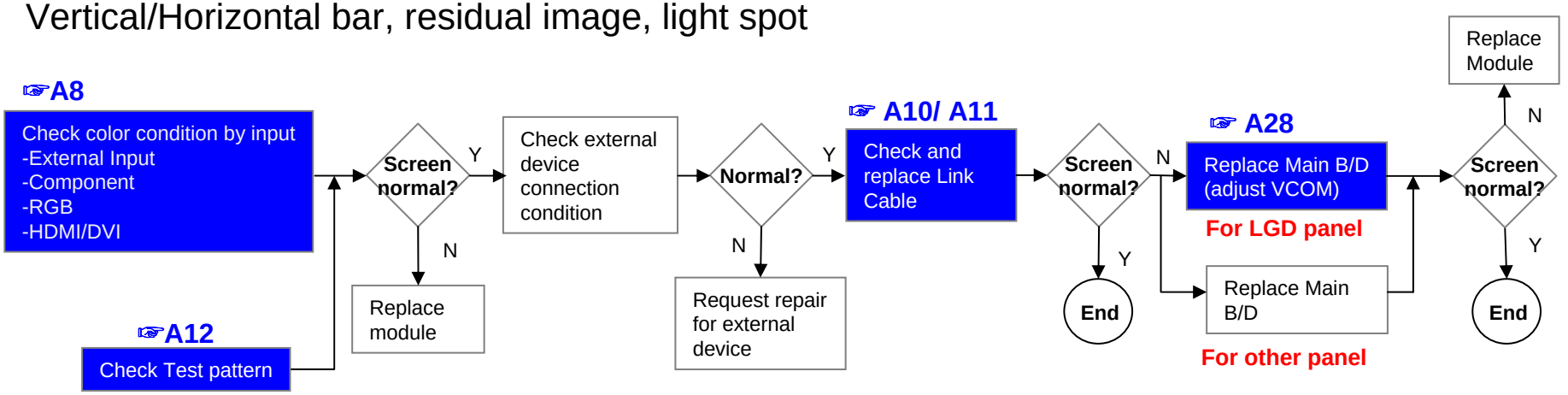


LCD TV	Error symptom	A. Video error	Established date	2010. 12 .14	
		Color error	Revised date		5/14

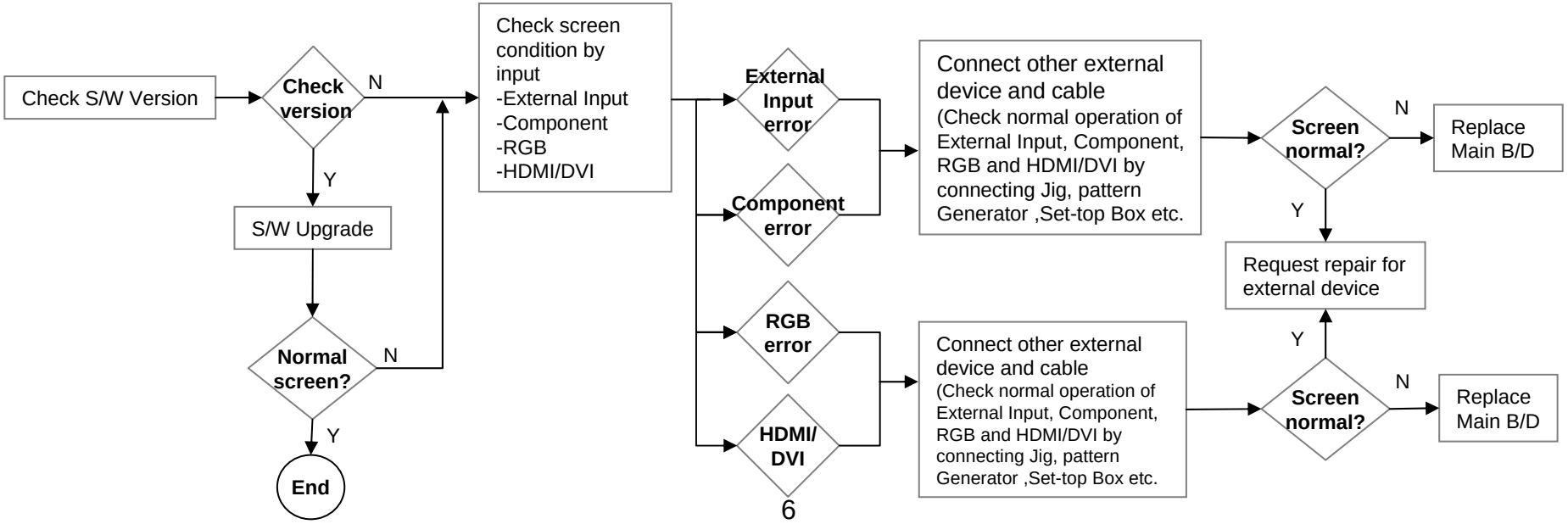


Standard Repair Process					
LCD TV	Error symptom	A. Video error	Established date	2010. 12 .14	
		Vertical / Horizontal bar, residual image, light spot, external device color error	Revised date		6/14

Vertical/Horizontal bar, residual image, light spot

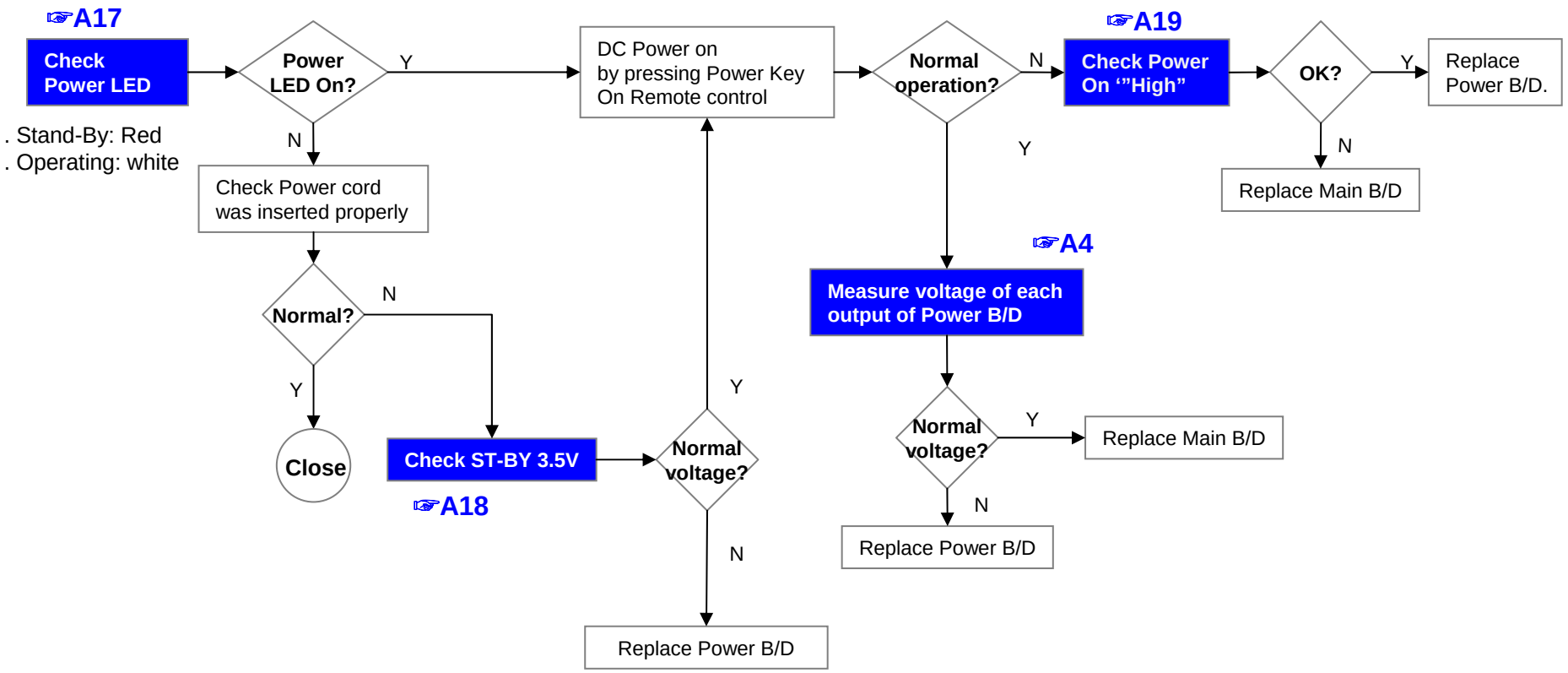


External device screen error-Color error



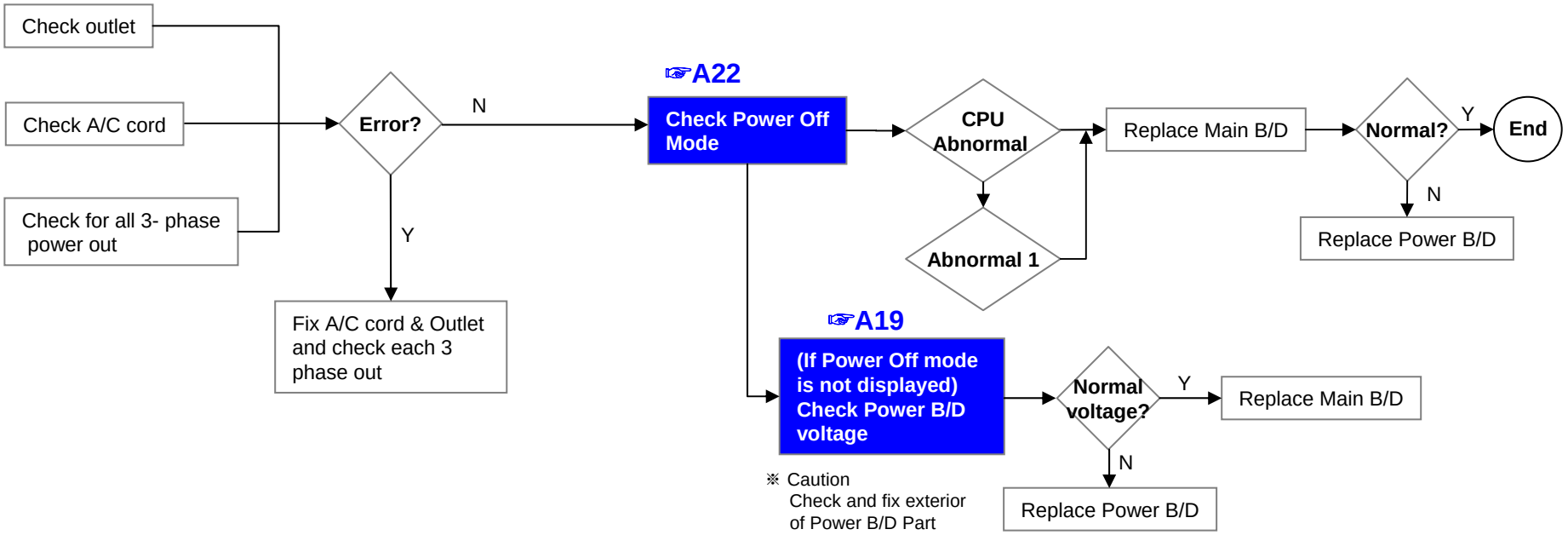
Standard Repair Process

LCD TV	Error symptom	B. Power error	Established date	2010. 12 .14	
		No power	Revised date		7/14



Standard Repair Process

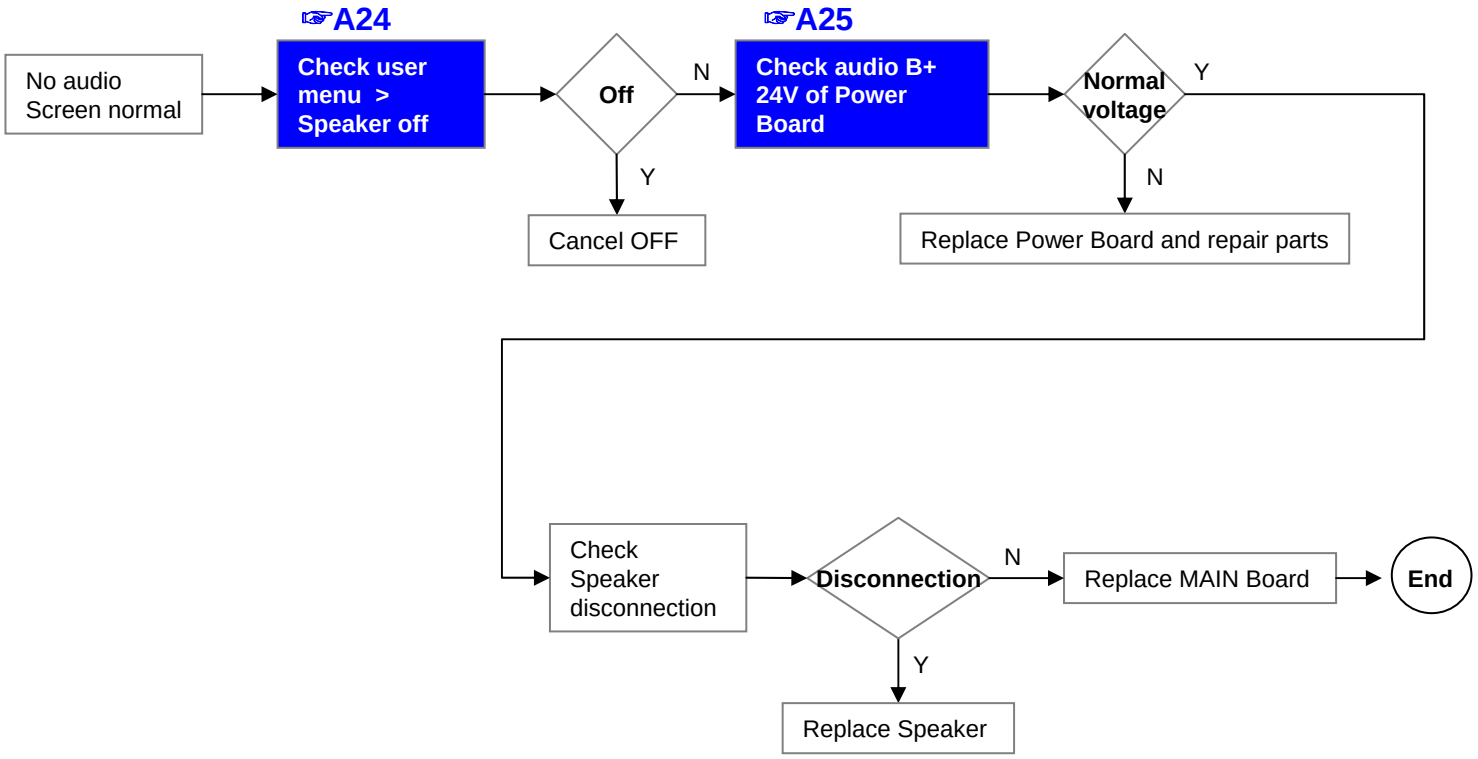
LCD TV	Error symptom	B. Power error	Established date	2010. 12 .14	
		Off when on, off while viewing, power auto on/off	Revised date		8/14



*** Please refer to the all cases which can be displayed on power off mode.**

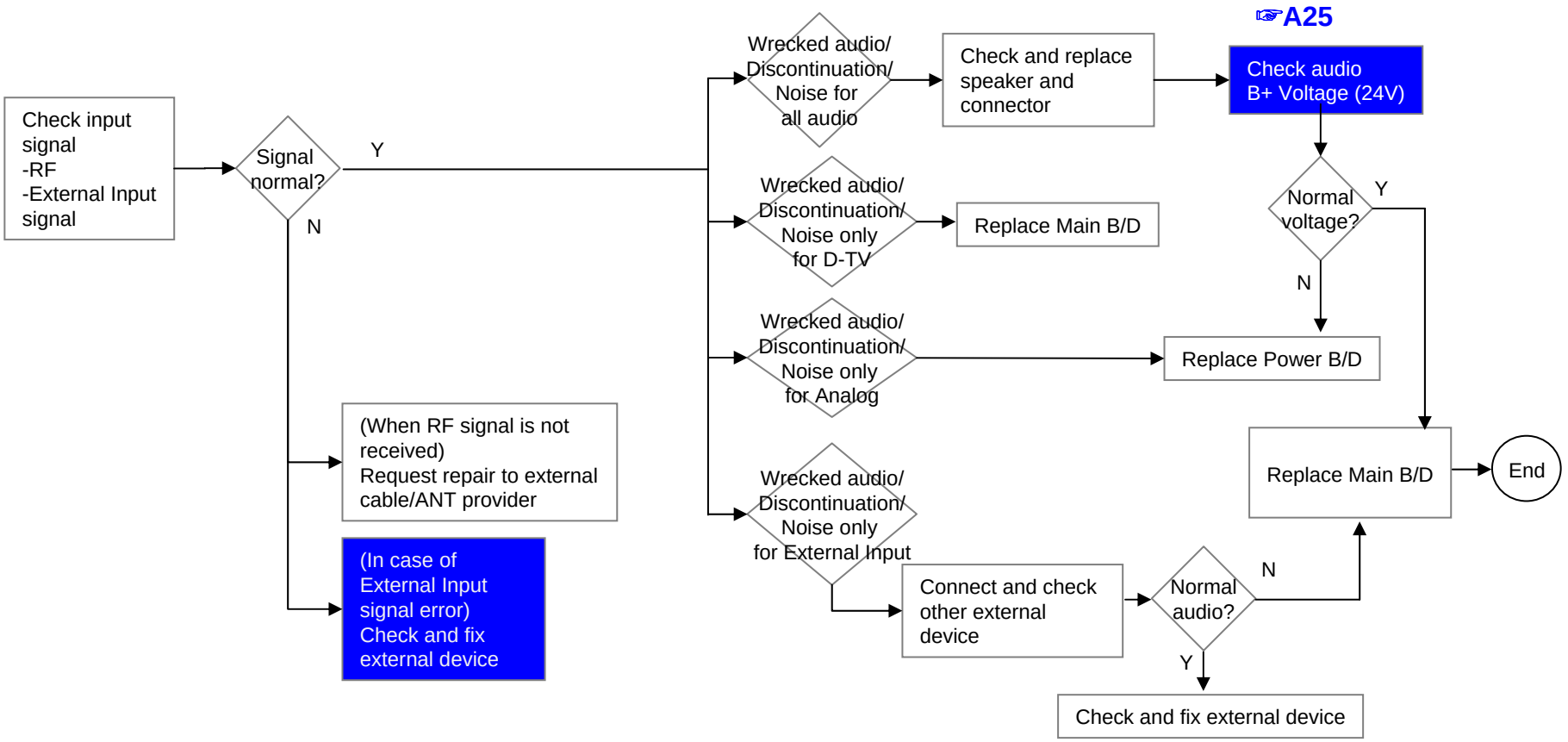
Status	Power off List	Explanation
Normal	"POWEROFF_REMOTEKEY"	Power off by REMOTE CONTROL
	"POWEROFF_OFFTIMER"	Power off by OFF TIMER
	"POWEROFF_SLEEPTIMER"	Power off by SLEEP TIMER
	"POWEROFF_INSTOP"	Power off by INSTOP KEY
	"POWEROFF_AUTOOFF"	Power off by AUTO OFF
	"POWEROFF_ONTIMER"	Power off by ON TIMER
	"POWEROFF_RS232C"	Power off by RS232C
	"POWEROFF_RESREC"	Power off by Reserved Record
	"POWEROFF_RECEND"	Power off by End of Recording
	"POWEROFF_SWDOWN"	Power off by S/W Download
	"POWEROFF_UNKNOWN"	Power off by unknown status except listed case
Abnormal	"POWEROFF_ABNORMAL1"	Power off by abnormal status except CPU trouble
	"POWEROFF_CPUABNORMAL"	Power off by CPU Abnormal

LCD TV	Error symptom	C. Audio error	Established date	2010. 12 .14	
		No audio/ Normal video	Revised date		9/14



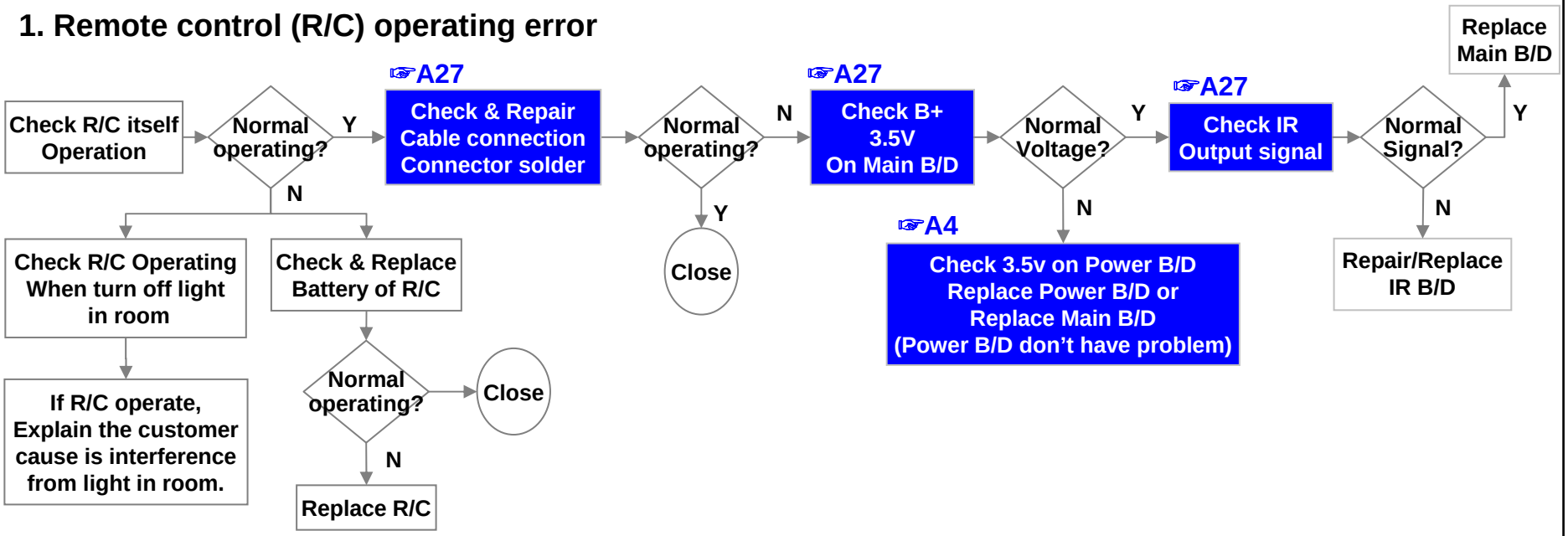
LCD TV	Error symptom	C. Audio error	Established date	2010. 12 .14	
		Wrecked audio/ discontinuation/noise	Revised date		10/14

→ abnormal audio/discontinuation/noise is same after “Check input signal” compared to No audio

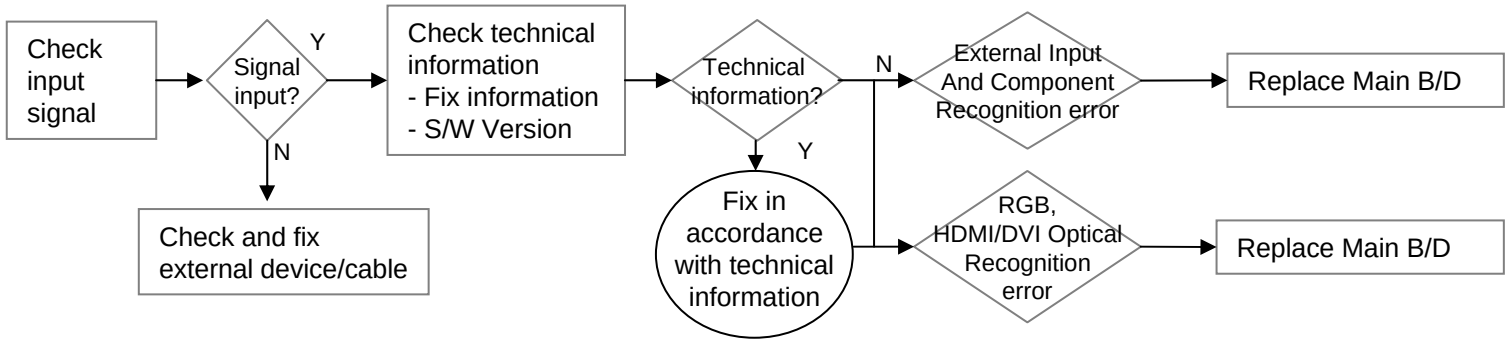


LCD TV	Error symptom	D. General Function Problem	Established date	2010. 12 .14	
		Remote control & Local switch checking	Revised date		11/14

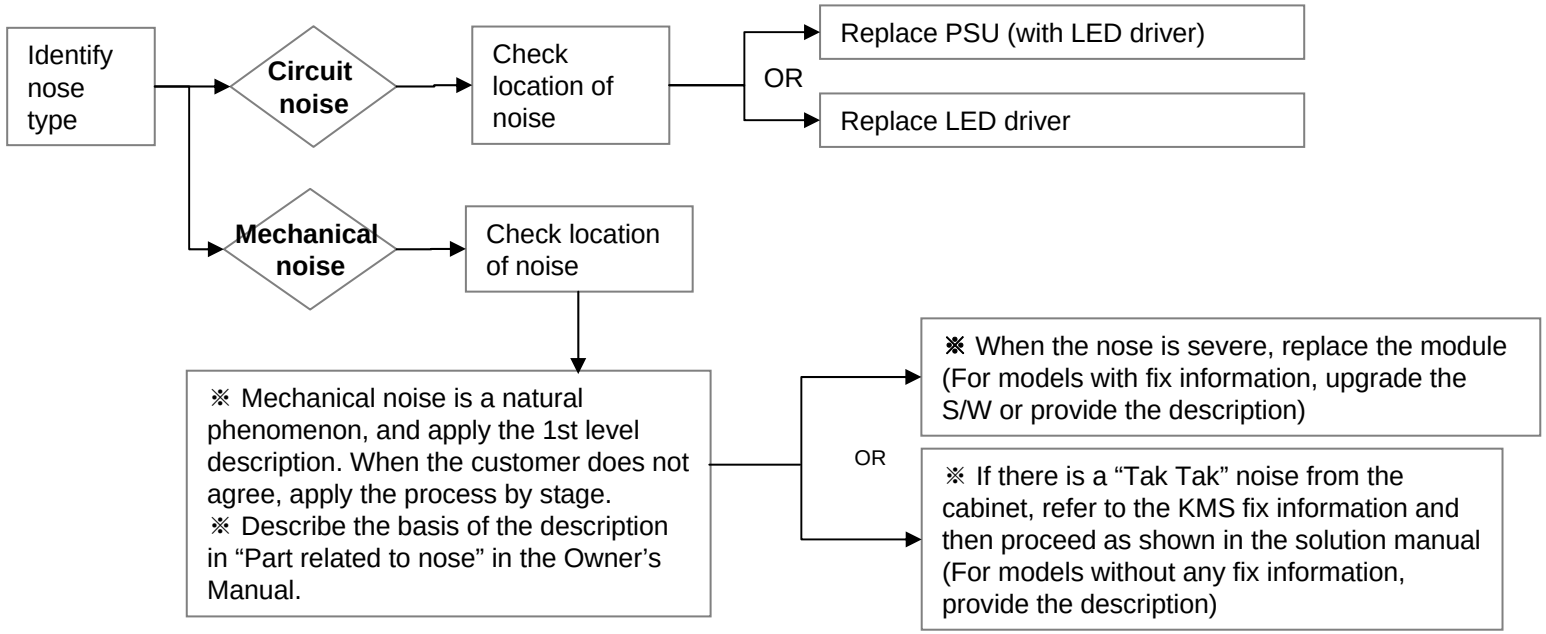
1. Remote control (R/C) operating error



LCD TV	Error symptom	D. Function error	Established date	2010. 12 .14	
		External device recognition error	Revised date		12/14



LCD TV	Error symptom	E. Noise	Established date	2010. 12 .14	
		Circuit noise, mechanical noise	Revised date		13/14



LCD TV	Error symptom	F. Exterior defect	Established date	2010. 12 .14	
		Exterior defect	Revised date		14/14